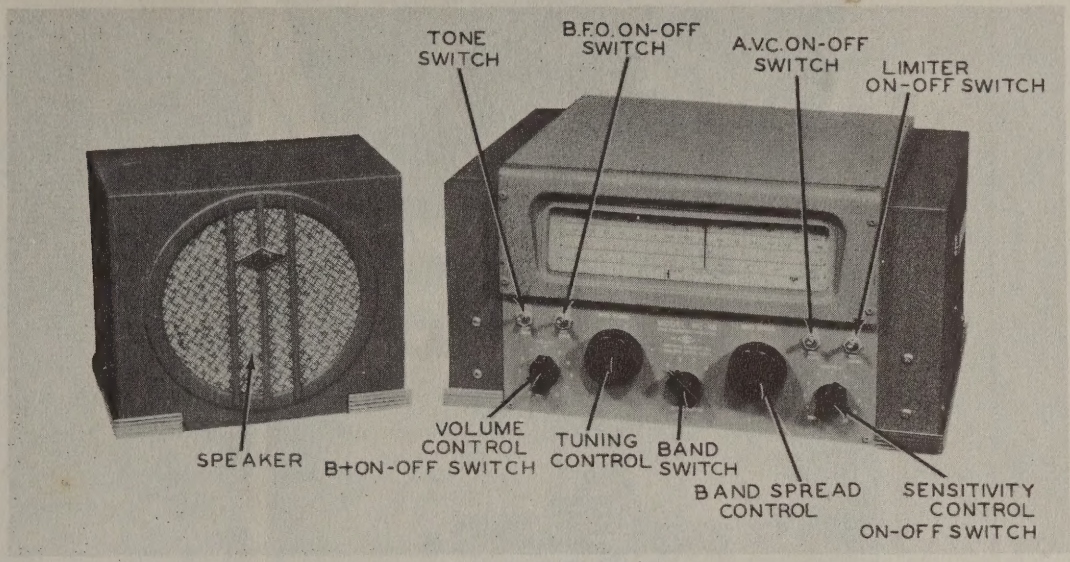


NATIONAL MODEL NC-46

TRADE NAME	National Model NC-46
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC-DC 4 Band Superheterodyne Communications Receiver
TUBES (TEN)	Types, 6K8 Converter, 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 2nd Det.-Limiter, 6SJ7 BFO, 6SF7 AVC, 6SC7 Amp.-Phase Inv., 2-25L6GT Power Output, 25Z5GT Rectifier.
POWER SUPPLY	110-130 Volts AC — RATING .540 Amps. @ 117V AC
TUNING RANGE—BROADCAST	540-1600KC — **SHORT WAVE** 1.55-4.6MC, 4.4-12.0MC, 11.5-30.0 MC

ALIGNMENT INSTRUCTIONS

To set pointer, turn variable fully closed and set pointer at last reference mark at the left end of the "D" scale. Disconnect the antenna and set the controls as follows: Volume control at maximum, tone switch at "Hi" position, C.W.O. off, A.V.C. off, limiter off and sensitivity control at maximum. To determine correct IF Freq., feed signal into converter grid and slowly turn signal generator between 452 and 458KC. At the point where there is a sharp increase in the output is the correct IF freq. Keep band spread pointer at 90 throughout alignment procedure. Care should be taken that the oscillator is not aligned on the image freq. To check, increase the output of the signal generator and tune the receiver approx. 910KC below the signal generator freq. The image freq. should be heard and should be considerably weaker. If the image freq. is not heard, the oscillator trimmer should be decreased in capacity until the fundamental freq. appears at the proper dial setting. Use isolation trans. if available. If not, connect capacitor in series with the low side of the signal generator and chassis. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to grid cap of 6K8. Low side to chassis.	See instructions above	D	High freq. end.	Across voice coil	A1,A2, A3,A4, A5,A6.	Adjust for maximum output. If isolation trans. is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
.1 MFD.	"	"	"	"	"	A7	Turn CWO switch "on" and adjust for an approximate 1000 cycle audio note.
500 ohm carbon resistor	High side to ant. terminal. Low side to chassis.	30.0MC	A	30.0MC	"	A8	Turn CWO to "off" position. Adjust for maximum output.
"	"	28.0MC	"	Tune for maximum output.	"	A9	Rock dial and adjust for maximum output.
"	"	12.0MC	B	12.0MC	"	A10	Adjust for maximum output.
"	"	11.0MC	"	Tune for maximum output.	"	A11	Rock dial and adjust for maximum output.
"	"	4.6MC	C	4.6MC	"	A12	Adjust for maximum output.
"	"	4.0MC	"	Tune for maximum output.	"	A13	Rock dial and adjust for maximum output.
"	"	1500KC	D	1500KC	"	A14	Adjust for maximum output.
"	"	600KC	"	600KC	"	A15	Adjust for maximum output. Recheck A14 at 1500KC.
"	"	1400KC	"	Tune for maximum output.	"	A16	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1946 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc."

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6K8	6K8	8K	
2	1st IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	2nd Det.-Limiter	6H6	6H6	7Q	
5	BFO	6SJ7	6SJ7	8N	
6	AVC	6SF7	6SF7	7AZ	
7	Amp.-Phase Inv.	6SC7	6SC7	8S	
8	Power Output	25L6GT/G	25L6GT/G	7AC	
9	Power Output	25L6GT/G	25L6GT/G	7AC	
10	Rectifier	25Z5GT	25Z5GT	6E	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	Filter
12	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	"
13	25	50		M-25-50	TA-525	PRS50-25	BR255	TC36	Audio Cath. Bypass
14	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Line Filter
15	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	BFO Plate Decoupling
16	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Filament Bypass
17	.02	400		S-4-02	TC-12	484-02	DT4S2	TP423	Tone Compensation
18	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	25L6 Plate Bypass
19	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
20	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	"
21	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Vol. Cont. Isolation
22	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Noise Limiter Filter
24	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Plate Bypass
25	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Cath. Bypass
27	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Grid Bypass
28	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Plate Bypass
29	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
30	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Cath. Bypass
31	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	RF Bypass Pwr. Supp.
32	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Filter
33	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Cath. Bypass
34	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Grid Bypass
35	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Plate Bypass
36	.1	200		S-4-1M	TC-10	484-.1	DT4W1	TP422	RF Bypass Pwr. Supp.
37	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Screen Bypass
38	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Cath. Bypass
39	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Cabinet Isolation
40	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
41	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Voice Coil Isolation
42	270	500		M0.5-325	1FM-325	1468-00025	5W5T25	MC240	Audio Grid Bypass
43	1	400							BFO Coupling
44	50	500		M0.5-45	1FM-45	1468-00005	5W5Q5	MC225	Audio Coupling
45	1000	500		M0.3-21	1FM-21	1467-001	5W5D1	MC255	AVC Diode Coupling
46	270	500		M0.5-325	1FM-325	1468-00025	5W5T25	MC240	6H6 Plate Bypass
47	100	500		M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
48	4700	500		MW.5-25	1FM-25	1467-005	1D5D5	MC465	Osc. Coupling
49	Capacitor Ratings Differ for each Coil Range and Definite Ratings cannot be Listed.								
112	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.*

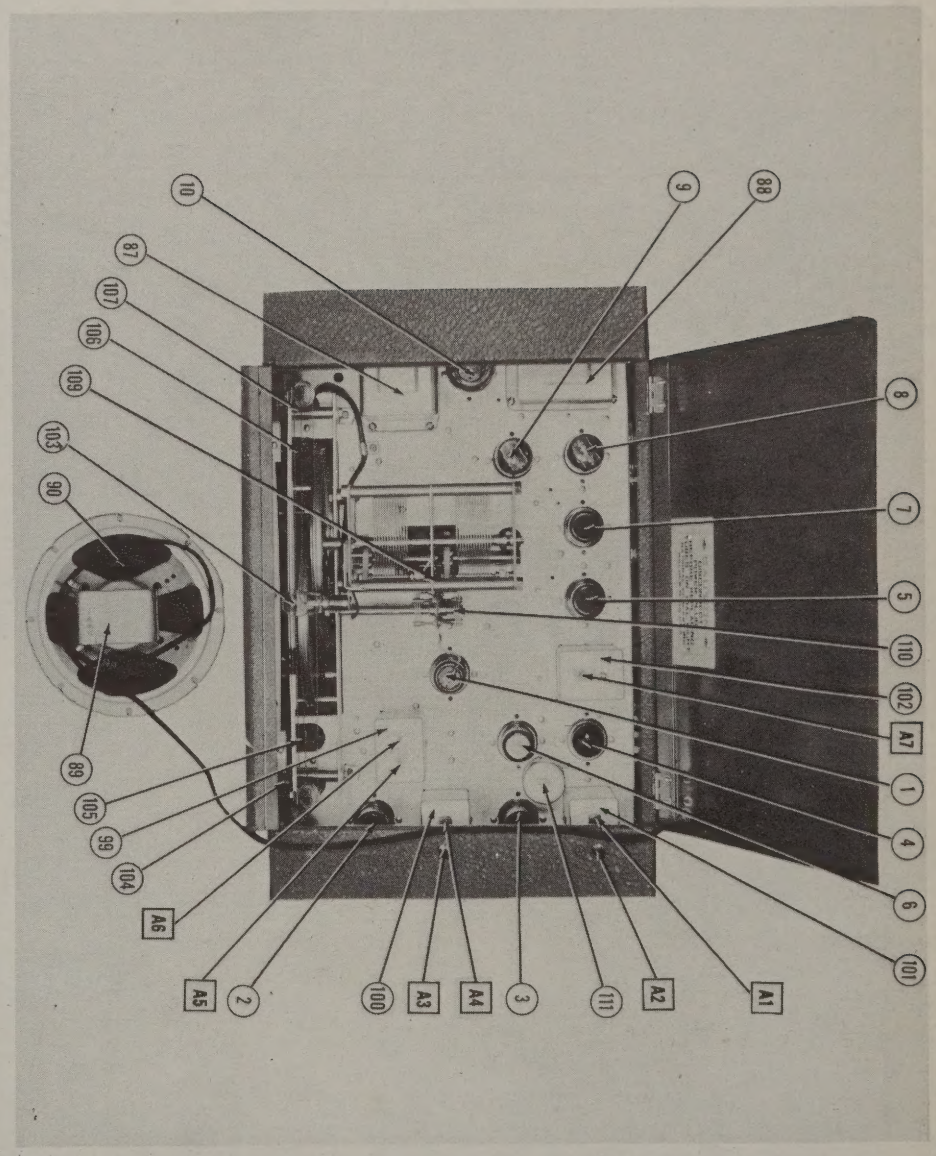
*Not Used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
50A	500KΩ	1		MR48#	D13-133#	M-60-Z#	Volume Control & B+ Switch
B	Shaft			Not Req.	A	Not Req.	Attach to 50A per instructions
C	Switch			M26	41	SW-A	" " " " "
51A	10KΩ	1.5		G	W-10K	P-58-S-10K	Sensitivity Control & AC Switch
B	Shaft			Not Req.	A		Attach to 51A per instructions
C	Switch			6-9	41		" " " " "

#Use ground lug supplied with control for shell bypass and original insulating sleeve to isolate control from chassis.

CHASSIS—TOP VIEW

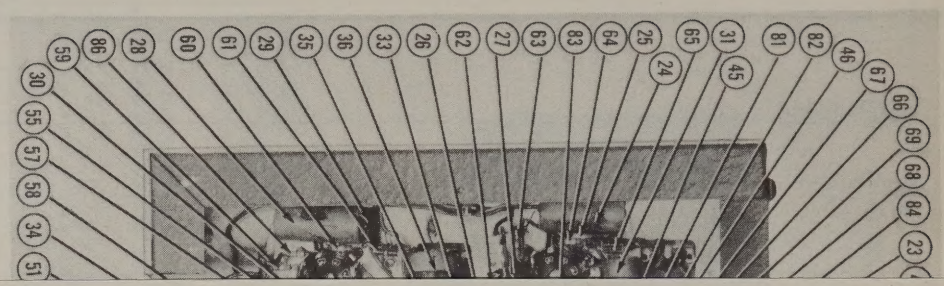


PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
52	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Network
53	10KΩ	½		BTS-10K	Br.-Blk.-Or. Oscillator Plate Load
54	220Ω	½		BW-½-220	Red-Red-Br. Converter Cathode
55	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Screen Dropping
56	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
57	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Plate Dropping
58	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Network
59	560Ω	½		BTS-560	Grn.-Blue-Br. 1st IF Cathode
60	22KΩ	½		BTS-22K	Red-Red-Or. 1st IF Screen Dropping
61	1000Ω	½		BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
62	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Network
63	560Ω	½		BTS-560	Grn.-Blue-Br. 2nd IF Cathode
64	22KΩ	½		BTS-22K	Red-Red-Or. 2nd IF Screen Dropping

CHASSIS—BOTTOM VIEW



CONTROLS SET AS FOLLOWS: VOLUME AND SENSITIVITY CONTROLS "FULL ON", AVC AND LIMITER "ON", TONE SWITCH ON "HIGH", BAND SWITCH AT "D", CWO SWITCH ON FOR 6SJ7 READINGS ONLY.

VOLTAGE READINGS

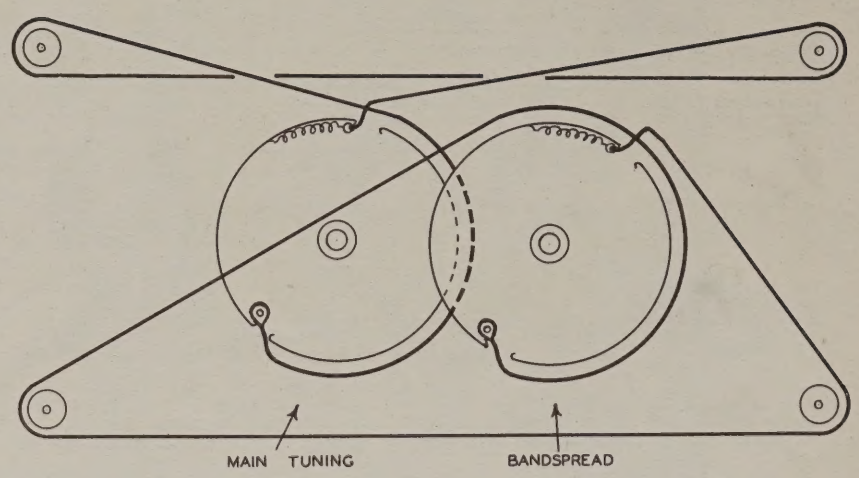
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0V.	17V.AC	103V.DC	98V.DC	-1.8V.DC	76V.DC	11V.AC	3V.DC	0V.
2	6SG7	0V.	17V.AC	1.15V.DC	0V.	1.15V.DC	57V.DC	23.5V.AC	103V.DC	
3	6SG7	0V.	30V.AC	1.75V.DC	0V.	1.75V.DC	87V.DC	23.5V.AC	102V.DC	
4	6H6	0V.	0V.	-.1V.DC	0V.	-.2V.DC	0V.	5V.AC	0V.	
5	6SJ7	0V.	30V.AC	0V.	-.35V.DC	0V.	-.2V.DC	35.5V.AC	40V.DC	
6	6SF7	0V.	0V.	15V.DC	107V.DC	0V.	107V.DC	5V.AC	11V.AC	
7	6SC7	0V.	49V.DC	.3V.DC	0V.	73V.DC	105V.DC	42V.AC	35.5V.AC	
8	25L6GT/G	0V.	42V.AC	112V.DC	107V.DC	.4V.DC	0V.	70V.AC	7.1V.DC	
9	25L6GT/G	0V.	95V.AC	112V.DC	107V.DC	.2V.DC	.3V.DC	70V.AC	7.1V.DC	
10	25Z5	95V.AC	117V.AC	117V.DC	117V.DC	117V.AC	117V AC			

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0Ω	11Ω	51KΩ	51KΩ	19.5KΩ	60KΩ	8Ω	225Ω	1.3MEG.
2	6SG7	0Ω	11Ω	510 Ω	1.3MEG.	510Ω	35KΩ	15Ω	51KΩ	
3	6SG7	0Ω	18Ω	490Ω	1.3MEG.	490Ω	73KΩ	15Ω	52KΩ	
4	6H6	0Ω	0Ω	450KΩ	2.7MEG.	875KΩ	1.8MEG.	4Ω	0Ω	
5	6SJ7	0Ω	18Ω	0Ω	43KΩ	.6Ω	95KΩ	22Ω	82KΩ	
6	6SF7	0Ω	1.8MEG.	19.5 KΩ	50KΩ	450KΩ	50KΩ	4Ω	8Ω	
7	6SC7	0Ω	320KΩ	265KΩ	510KΩ	320 KΩ	29KΩ	26Ω	22Ω	
8	25L6GT/G	0Ω	26Ω	50KΩ	50KΩ	530KΩ	INF.	37Ω	58Ω	
9	25L6GT/G	0Ω	49Ω	50KΩ	50KΩ	520KΩ	265KΩ	37Ω	58Ω	
10	25Z5	49Ω	56Ω	50KΩ	50KΩ	56Ω	56Ω			

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.



DIAL CORD DRIVE

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6K8	6K8	8K	
2	1st IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	2nd Det.-Limiter	6H6	6H6	7Q	
5	BFO	6SJ7	6SJ7	8N	
6	AVC	6SF7	6SF7	7AZ	
7	Amp.-Phase Inv.	6SC7	6SC7	8S	
8	Power Output	25L6GT/G	25L6GT/G	7AC	
9	Power Output	25L6GT/G	25L6GT/G	7AC	
10	Rectifier	25Z5GT	25Z5GT	6E	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	Filter
12	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	"
13	25	50		M-25-50	TA-525	PRS50-25	BR255	TC36	Audio Cath. Bypass
14	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Line Filter
15	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	BFO Plate Decoupling
16	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Filament Bypass
17	.02	400		S-4-02	TC-12	484-02	DT4S2	TP423	Tone Compensation
18	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	25L6 Plate Bypass
19	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
20	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	" "
21	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Vol. Cont. Isolation
22	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Noise Limiter Filter
24	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Plate Bypass
25	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Cath. Bypass
27	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Grid Bypass
28	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Plate Bypass
29	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
30	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Cath. Bypass
31	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	RF Bypass Pwr. Supp.
32	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Filter
33	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Cath. Bypass
34	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Grid Bypass
35	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Plate Bypass
36	.1	200		S-4-1M	TC-10	484-.1	DT4W1	TP422	RF Bypass Pwr. Supp.
37	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Screen Bypass
38	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Cath. Bypass
39	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Cabinet Isolation
40	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
41	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Voice Coil Isolation
42	270	500		M0.5-325	1FM-325	1468-00025	5W5T25	MC240	Audio Grid Bypass
43	1	400							BFO Coupling
44	50	500		M0.5-45	1FM-45	1468-00005	5W5Q5	MC225	Audio Coupling
45	1000	500		M0.3-21	1FM-21	1467-001	5W5D1	MC255	AVC Diode Coupling
46	270	500		M0.5-325	1FM-325	1468-00025	5W5T25	MC240	6H6 Plate Bypass
47	100	500		M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
48	4700	500		MW.5-25	1FM-25	1467-005	1D5D5	MC465	Osc. Coupling
49	Capacitor Ratings Differ for each Coil Range and Definite Ratings cannot be Listed.								
112	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.*

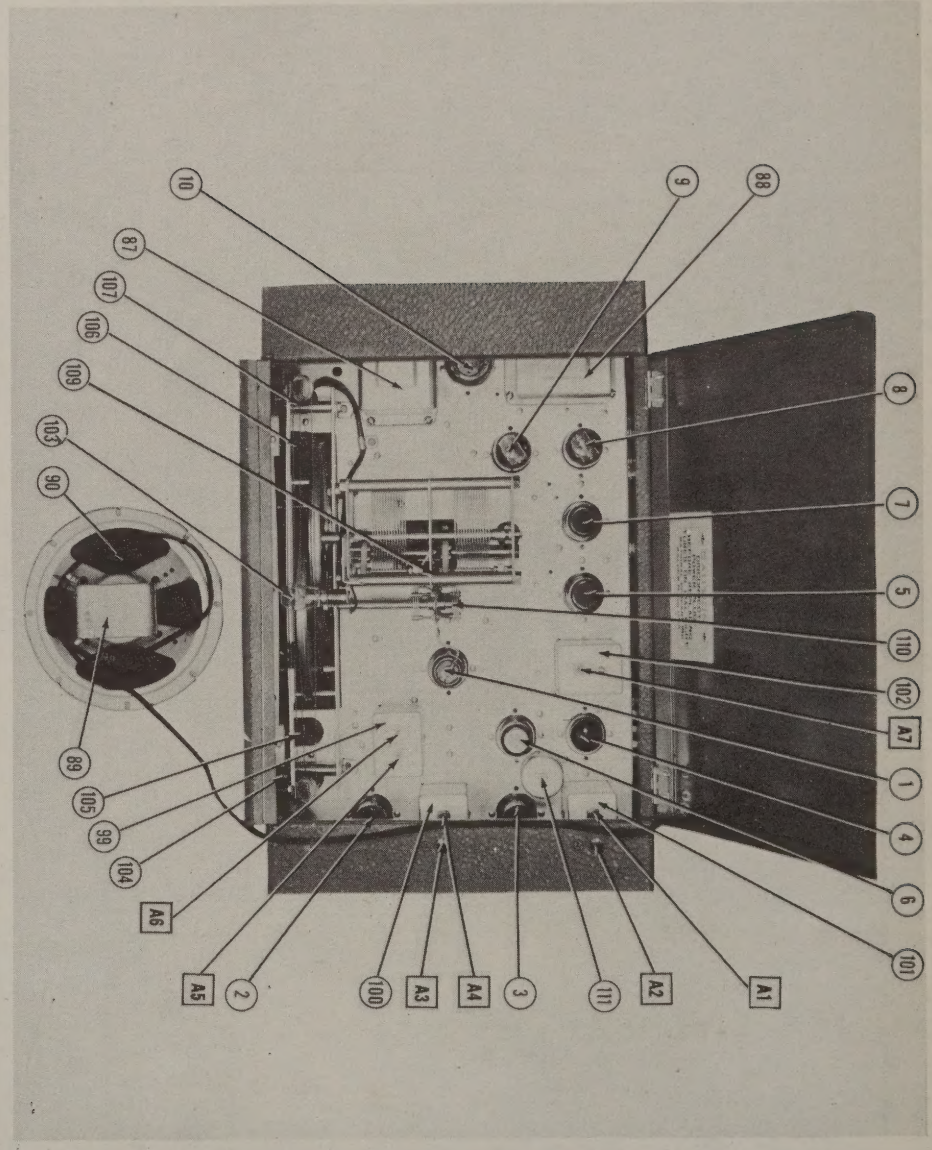
*Not Used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
50A	500KΩ	1		MR48#	D13-133#	M-60-Z#	Volume Control & B+ Switch
B	Shaft			Not Req.	A	Not Req.	Attach to 50A per instructions
C	Switch			M26	41	SW-A	" " " " "
51A	10KΩ	1.5		G	W-10K	P-58-S-10K	Sensitivity Control & AC Switch
B	Shaft			Not Req.	A		Attach to 51A per instructions
C	Switch			6-9	41		" " " " "

#Use ground lug supplied with control for shell bypass and original insulating sleeve to isolate control from chassis.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
52	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
53	10KΩ	½		BTS-10K	Br.-Blk.-Or. Oscillator Plate Load
54	220Ω	½		BW-½-220	Red-Red-Br. Converter Cathode
55	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Screen Dropping
56	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
57	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Plate Dropping
58	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
59	560Ω	½		BTS-560	Grn.-Blue-Br. 1st IF Cathode
60	22KΩ	½		BTS-22K	Red-Red-Or. 1st IF Screen Dropping
61	1000Ω	½		BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
62	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
63	560Ω	½		BTS-560	Grn.-Blue-Br. 2nd IF Cathode
64	22KΩ	½		BTS-22K	Red-Red-Or. 2nd IF Screen Dropping
65	2200Ω	½		BTS-2200	Red-Red-Red 2nd IF Plate Decoupling
66	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Noise Limiter Filter
67	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Diode Load
68	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Noise Limiter Diode Load
69	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Diode Load
70	3700Ω	½		BTS-3900	Or.-Vi.-Red 1st AF Cathode
71	270KΩ	½		BTS-270K	Red-Vi.-Yl. 1st AF Plate Load
72	270KΩ	½		BTS-270K	Red-Vi.-Yl. 2nd AF Grid
73	270KΩ	½		BTS-270K	Red-Vi.-Yl. 2nd AF Plate Load
74	68Ω	½		BW-½-68	Blue-White-Blk. Output Cathode
75	270KΩ	½		BTS-270K	Red-Vi.-Yl. Output Grid
76	270KΩ	½		BTS-270K	Red-Vi.-Yl. Output Grid
77	5Ω	5		AB-5	Headphone Shunt
78	100KΩ	½		BTS-100K	Br.-Blk.-Yl. BFO Plate Dropping
79	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Bleeder
80	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Bleeder
81	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
82	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Load
83	22KΩ	½		BTS-22K	Red-Red-Or. AVC Amplifier Cathode
84	2 Meg.	½		BTS-2.2 Meg.	Red-Blk.-Grn. AVC Amplifier Grid
85	100Ω	½		BW-½-100	Br.-Blk.-Br. Detecter-Limiter Filament Shunt
86	33KΩ	½		BTS-33K	Or.-Or.-Or. Bleeder

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA			INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000~)	NATIONAL PART NO.	STANCOR PART NO.	THORDARSON PART NO.	
87	20 MA	270Ω	10 Henries		C-1355†	T20C53†	†Drill new mounting hole.

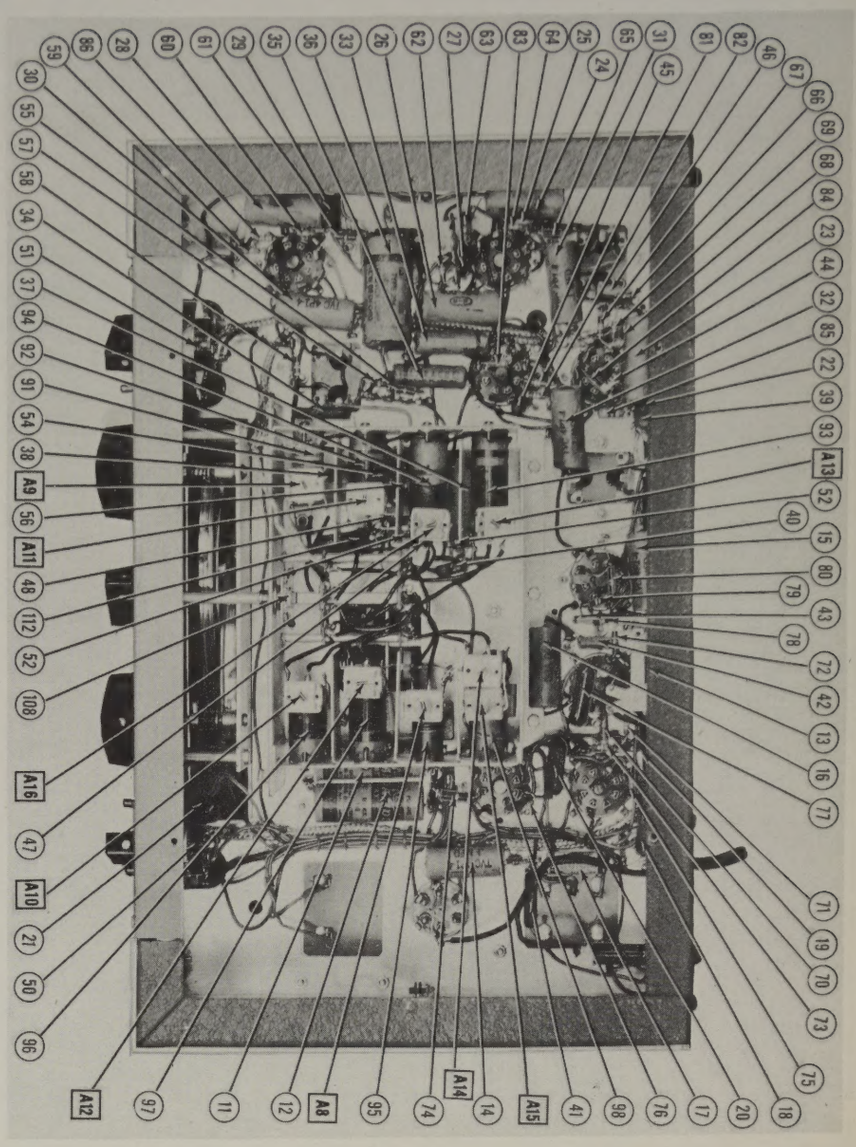
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
88	1500Ω CT	3.4Ω	65Ω CT	.4Ω					

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			NATIONAL PART No.	JENSEN PART No.		
89	FIELD	VC IMP.		ST-111		
	PM	3.4Ω		Mod. P6-V		
	CONE DIA.	VC DIA.				
90	6"	5/8"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PRI.	SEC.	NATIONAL PART No.	MEISSNER PART No.	
91	Ant.Coil-Brd.D	3Ω	5Ω			
92	" " " C	1.5Ω	.8Ω			
93	" " " B	.5Ω	.2Ω			
94	" " " A	.1Ω	0Ω			
95	Osc.Coil-Brd.D	.8Ω	2.6Ω			
96	" " " C	1.6Ω	.8Ω			
97	" " " B	.5Ω	0Ω			
98	" " " A	0Ω	0Ω			
99	1st IF Trans.	2Ω	2Ω	SA-3363		
100	2nd " "	2Ω	2Ω	SA-3363		
101	3rd " "	2Ω	2Ω	SA-3363		
102	BFO Trans.			SA-3364		
111	AVC Induct.	46Ω				

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					NATIONAL PART No.		
103	Screw	115	.05				Type C-7

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
104	Limiter Switch		On-Off
105	AVC Switch		"
106	BFO Switch		"
107	Tone Switch		
108	Band Switch		
109	Tuning Cap.		2 Gang Variable Cap.
110	Bandspread Gang		

CONTROLS

The MAIN TUNING control knob is located to the left of the center of the front panel. This knob operates a two gang variable capacitor through a 30 to 1 radio reduction drive mechanism. The main tuning dial is the full vision slide rule type and features four accurate scales calibrated in megacycles which are easily and quickly read.

The ELECTRICAL BANDSPREAD control knob is located to the right of the center of the front panel. This knob operates a separate two gang variable capacitor to provide bandspread tuning. Thres is a separate scale and pointer provided for accurate logging of bandspread channels.

The BAND SELECTOR switch is located at the center of the front panel and functions to select the tuning band desired. The band in use is indicated by the designating letters on this switch dial. The four tuning scales on the main tuning dial are marked at either end of the dial by these designating letters.

Tuning is accomplished by the following steps:
(a) Select the band to be used by means of the BAND SELECTOR switch.
(b) The frequency calibration of the main tuning dial will only be correct with the bandspread pointer set at 90. After this setting has been made the MAIN TUNING control knob is used to tune in the desired station. The bandspread pointer may then be used to give greater accuracy in logging.

The TONE CONTROL switch is located at the upper left-hand side of the receiver and functions to select the frequency characteristic of the audio amplifier as desired, i.e. HIGH or LOW. The HIGH position will give the better fidelity and the LOW a better signal to noise ratio.

The C.W.O. CONTROL switch is located to the right of the TONE CONTROL switch functioning to switch on or off the beat frequency oscillator.

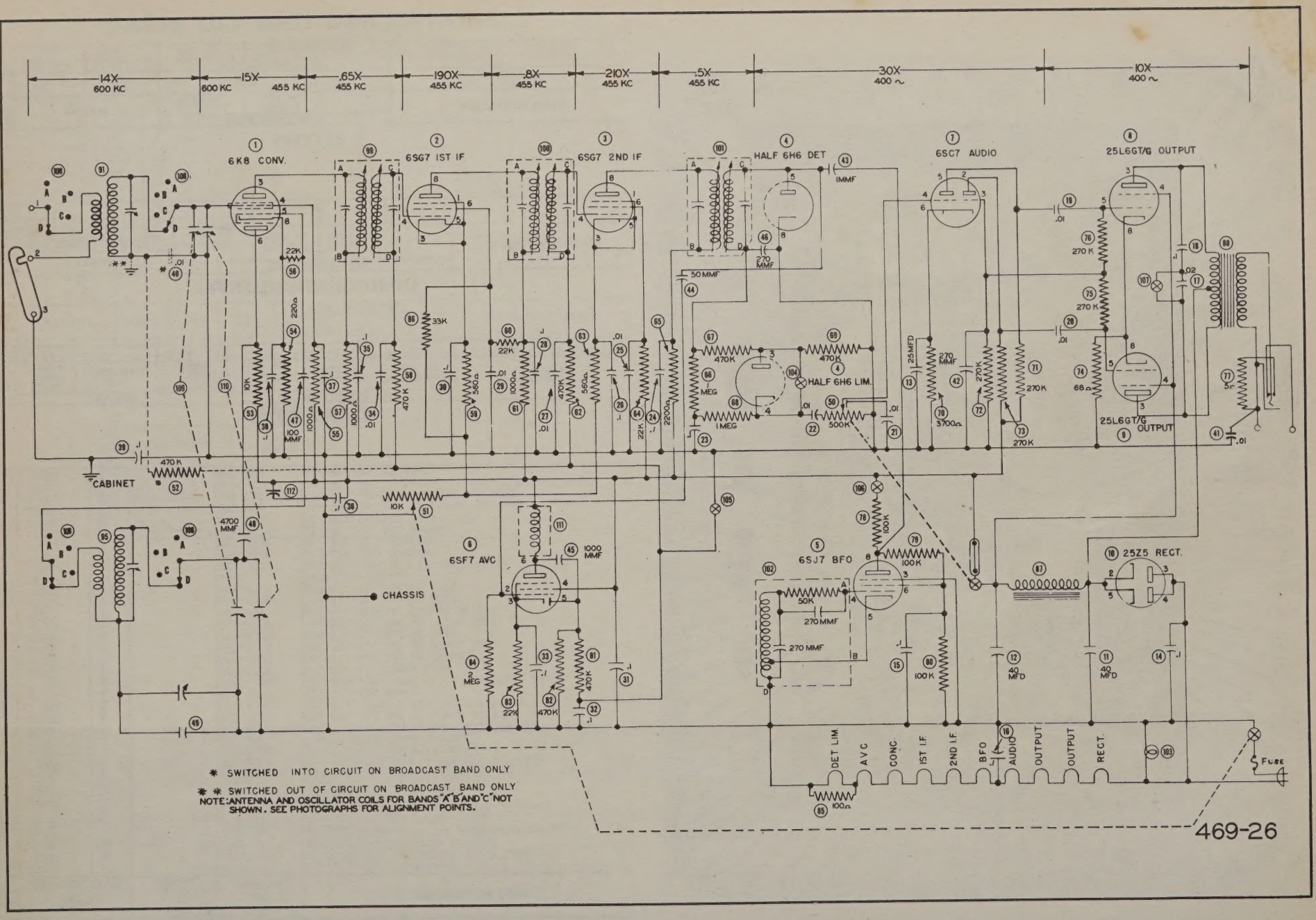
The VOLUME control is located to the left of the MAIN TUNING knob functioning to adjust the audio amplification of the receiver. Part of this control is a stand-by switch permitting the AC line switch to remain on but with B supply circuit open.

The LIMITER CONTROL switch is located at the upper right-hand side of the front panel functioning to switch "On" or "Off" the noise limiter. This control is normally in the "Off" position but can be turned "On" to suppress any undesired noise pulses.

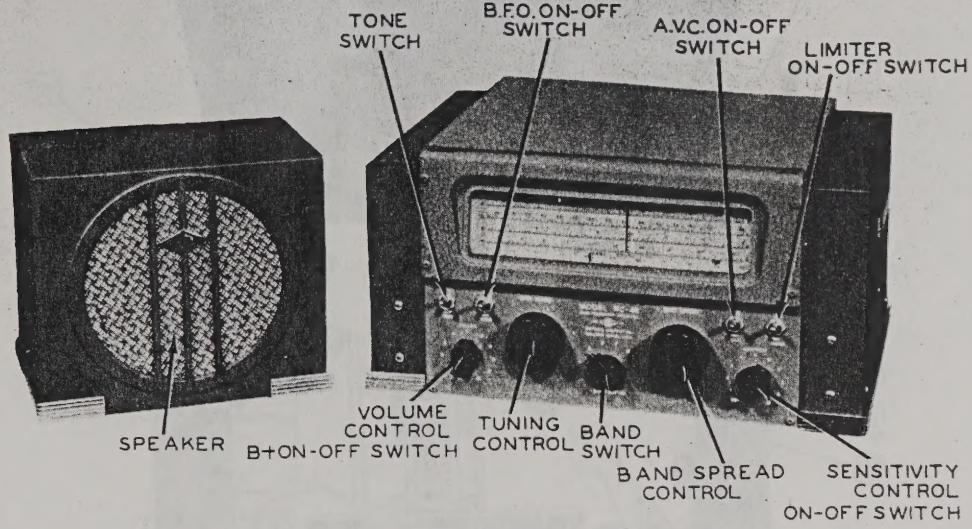
The AVC CONTROL switch is located to the left of the LIMITER switch functioning to switch the automatic volume control circuits into or out of the receiver circuits.

The SENSITIVITY control is located to the right of the BANDSPREAD control knob and functions to adjust the amplification of the two I.F. amplifier tubes. Incorporated in this control is the power supply "ON" "OFF" switch; with this switch in the "Off position the receiver is inoperative.

There is a B.S.W. terminal panel provided at the rear of the receiver to permit remote stand-by control. The terminals are connected in series with the B switch.



The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by turning AVC switch to off position. Sensitivity control set at maximum.



NATIONAL MODEL NC-46

TRADE NAME	National Model NC-46
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC-DC 4 Band Superheterodyne Communications Receiver
TUBES (TEN)	Types, 6K8 Converter, 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 2nd Det.-Limiter, 6SJ7 BFO, 6SF7 AVC, 6SC7 Amp.-Phase Inv., 2-25L6GT Power Output, 25Z5GT Rectifier.
POWER SUPPLY	110-130 Volts AC — RATING .540 Amps. @ 117V AC
TUNING RANGE—BROADCAST	540-1600KC — SHORT WAVE 1.55-4.6MC, 4.4-12.0MC, 11.5-30.0 MC

ALIGNMENT INSTRUCTIONS

To set pointer, turn variable fully closed and set pointer at last reference mark at the left end of the "D" scale. Disconnect the antenna and set the controls as follows: Volume control at maximum, tone switch at "Hi" position, C.W.O. off, A.V.C. off, limiter off and sensitivity control at maximum. To determine correct IF Freq., feed signal into converter grid and slowly turn signal generator between 452 and 458KC. At the point where there is a sharp increase in the output is the correct IF freq. Keep band spread pointer at 90 throughout alignment procedure. Care should be taken that the oscillator is not aligned on the image freq. To check, increase the output of the signal generator and tune the receiver approx. 910KC below the signal generator freq. The image freq. should be heard and should be considerably weaker. If the image freq. is not heard, the oscillator trimmer should be decreased in capacity until the fundamental freq. appears at the proper dial setting. Use isolation trans. if available. If not, connect capacitor in series with the low side of the signal generator and chassis. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to grid cap of 6K8. Low side to chassis.	See instructions above	D	High freq. end.	Across voice coil	A1,A2, A3,A4, A5,A6.	Adjust for maximum output. If isolation trans. is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
.1 MFD.	"	"	"	"	"	A7	Turn CWO switch "on" and adjust for an approximate 1000 cycle audio note.
500 ohm carbon resistor	High side to ant. terminal. Low side to chassis.	30.0MC	A	30.0MC	"	A8	Turn CWO to "off" position. Adjust for maximum output.
"	"	28.0MC	"	Tune for maximum output.	"	A9	Rock dial and adjust for maximum output.
"	"	12.0MC	B	12.0MC	"	A10	Adjust for maximum output.
"	"	11.0MC	"	Tune for maximum output.	"	A11	Rock dial and adjust for maximum output.
"	"	4.6MC	C	4.6MC	"	A12	Adjust for maximum output.
"	"	4.0MC	"	Tune for maximum output.	"	A13	Rock dial and adjust for maximum output.
"	"	1500KC	D	1500KC	"	A14	Adjust for maximum output.
"	"	600KC	"	600KC	"	A15	Adjust for maximum output. Recheck A14 at 1500KC.
"	"	1400KC	"	Tune for maximum output.	"	A16	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1946 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc."

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6K8	6K8	8K	
2	1st IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	2nd Det.-Limiter	6H6	6H6	7Q	
5	BFO	6SJ7	6SJ7	8N	
6	AVC	6SF7	6SF7	7AZ	
7	Amp.-Phase Inv.	6SC7	6SC7	8S	
8	Power Output	25L6GT/G	25L6GT/G	7AC	
9	Power Output	25L6GT/G	25L6GT/G	7AC	
10	Rectifier	25Z5GT	25Z5GT	6E	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	Filter
12	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	"
13	25	50		M-25-50	TA-525	PRS50-25	BR255	TC36	Audio Cath. Bypass
14	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Line Filter
15	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	BFO Plate Decoupling
16	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Filament Bypass
17	.02	400		S-4-02	TC-12	484-02	DT4S2	TP423	Tone Compensation
18	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	25L6 Plate Bypass
19	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
20	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	" "
21	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Vol. Cont. Isolation
22	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Noise Limiter Filter
24	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Plate Bypass
25	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Cath. Bypass
27	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Grid Bypass
28	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Plate Bypass
29	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
30	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Cath. Bypass
31	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	RF Bypass Pwr. Supp.
32	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Filter
33	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Cath. Bypass
34	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Grid Bypass
35	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Plate Bypass
36	.1	200		S-4-1M	TC-10	484-.1	DT4W1	TP422	RF Bypass Pwr. Supp.
37	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Screen Bypass
38	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Cath. Bypass
39	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Cabinet Isolation
40	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
41	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Voice Coil Isolation
42	270	500		MO.5-325	1FM-325	1468-00025	5W5T25	MC240	Audio Grid Bypass
43	1	400							BFO Coupling
44	50	500		MO.5-45	1FM-45	1468-00005	5W5Q5	MC225	Audio Coupling
45	1000	500		MO.3-21	1FM-21	1467-001	5W5D1	MC255	AVC Diode Coupling
46	270	500		MO.5-325	1FM-325	1468-00025	5W5T25	MC240	6H6 Plate Bypass
47	100	500		MO.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
48	4700	500		MW.5-25	1FM-25	1467-005	1D5D5	MC465	Osc. Coupling
49	Capacitor Ratings Differ for each Coil Range and Definite Ratings cannot be Listed.								
112	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.*

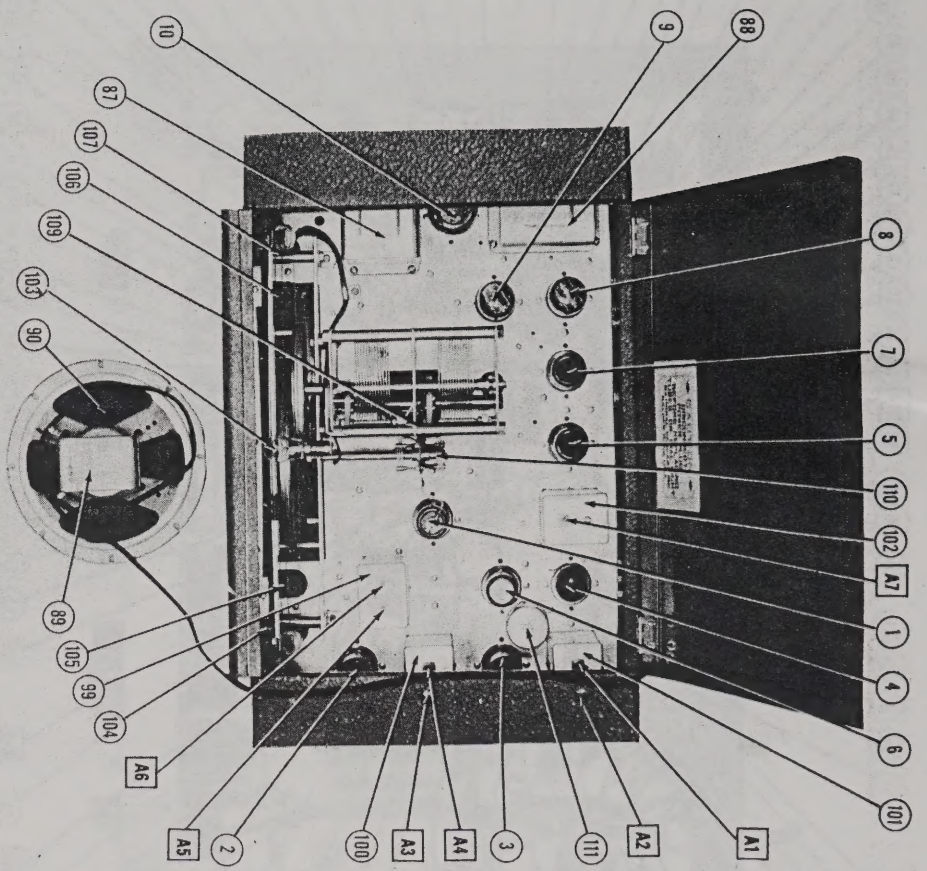
*Not Used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
50A	500KΩ	1		MR48#	D13-133#	M-60-Z#	Volume Control & B+ Switch
B	Shaft			Not Req.	A	Not Req.	Attach to 50A per instructions
C	Switch			M26	41	SW-A	" " " " "
51A	10KΩ	1.5		G	W-10K	P-58-S-10K	Sensitivity Control & AC Switch
B	Shaft			Not Req.	A		Attach to 51A per instructions
C	Switch			6-9	41		" " " " "

#Use ground lug supplied with control for shell bypass and original insulating sleeve to isolate control from chassis.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
52	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
53	10KΩ	½		BTS-10K	Br.-Blk.-Or. Oscillator Plate Load
54	220Ω	½		BW-½-220	Red-Red-Br. Converter Cathode
55	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Screen Dropping
56	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
57	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Plate Dropping
58	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
59	560Ω	½		BTS-560	Grn.-Blue-Br. 1st IF Cathode
60	22KΩ	½		BTS-22K	Red-Red-Or. 1st IF Screen Dropping
61	1000Ω	½		BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
62	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
63	560Ω	½		BTS-560	Grn.-Blue-Br. 2nd IF Cathode
64	22KΩ	½		BTS-22K	Red-Red-Or. 2nd IF Screen Dropping
65	2200Ω	½		BTS-2200	Red-Red-Red 2nd IF Plate Decoupling
66	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Noise Limiter Filter
67	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Diode Load
68	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Noise Limiter Diode Load
69	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Diode Load
70	3700Ω	½		BTS-3900	Or.-Vi.-Red 1st AF Cathode
71	270KΩ	½		BTS-270K	Red-Vi.-Yl. 1st AF Plate Load
72	270KΩ	½		BTS-270K	Red-Vi.-Yl. 2nd AF Grid
73	270KΩ	½		BTS-270K	Red-Vi.-Yl. 2nd AF Plate Load
74	68Ω	½		BW-½-68	Blue-White-Blk. Output Cathode
75	270KΩ	½		BTS-270K	Red-Vi.-Yl. Output Grid
76	270KΩ	½		BTS-270K	Red-Vi.-Yl. Output Grid
77	5Ω	5		AB-5	Headphone Shunt
78	100KΩ	½		BTS-100K	Br.-Blk.-Yl. BFO Plate Dropping
79	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Bleeder
80	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Bleeder
81	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
82	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Load
83	22KΩ	½		BTS-22K	Red-Red-Or. AVC Amplifier Cathode
84	2 Meg.	½		BTS-2.2 Meg.	Red-Blk.-Grn. AVC Amplifier Grid
85	100Ω	½		BW-½-100	Br.-Blk.-Br. Detecter-Limiter Filament Shunt
86	33KΩ	½		BTS-33K	Or.-Or.-Or. Bleeder

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA			INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000~)	NATIONAL PART NO.	STANCOR PART NO.	THORDARSON PART NO.	
87	25 MA	270Ω	10 Henries		C-1355†	T20C53†	†Drill new mounting hole.

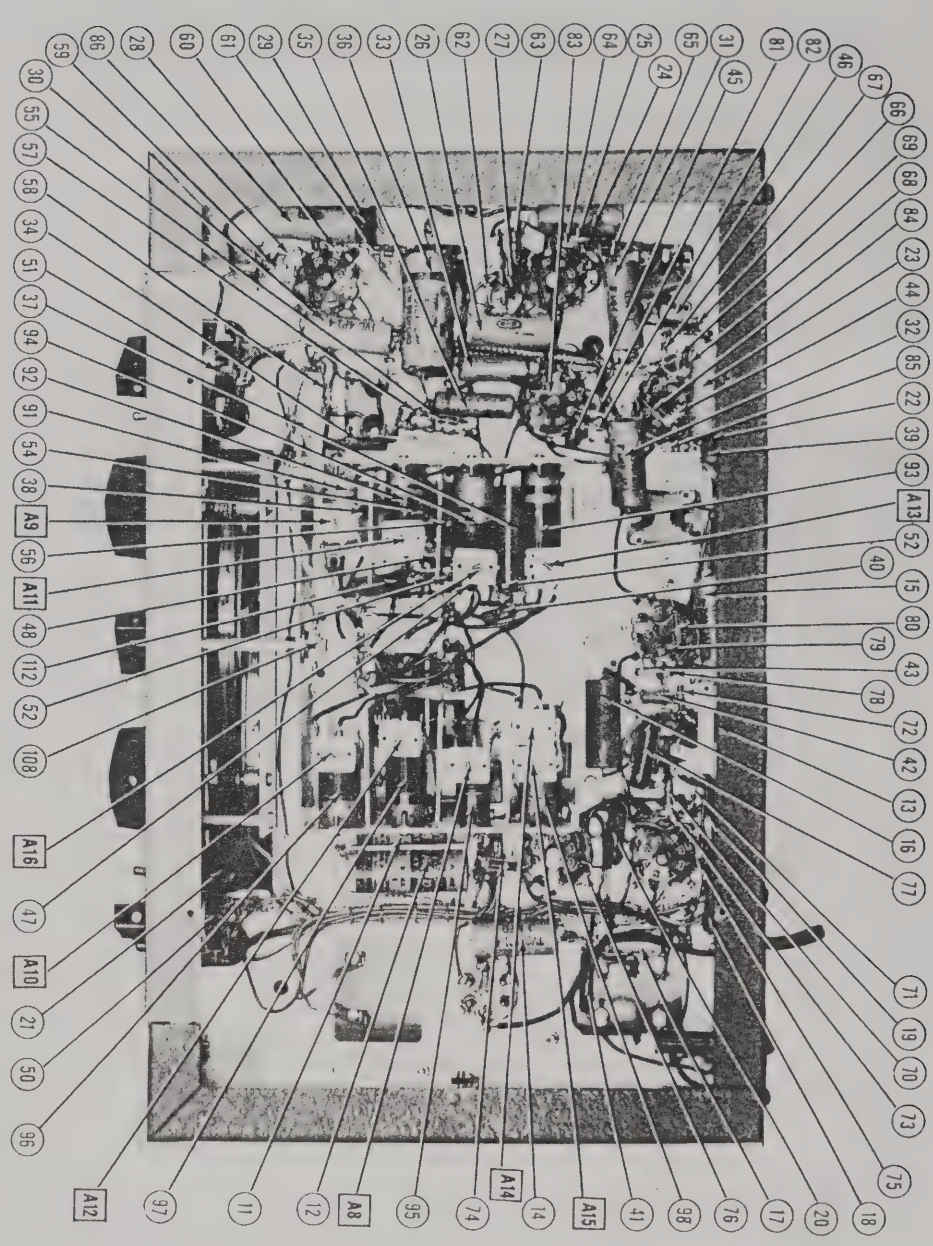
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
88	1500Ω CT	3.4Ω	65Ω CT	.4Ω					

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			NATIONAL PART No.	JENSEN PART No.		
	FIELD	VC IMP.		ST-111		
89	1M	3.4Ω		Mod. P8-V		
	CONE DIA.	VC DIA.				
90	8"	5/8"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA MEISSNER PART No.	INSTALLATION NOTES
91	Ant. Coil-Bnd. D	3Ω	5Ω			
92	" " " C	1.5Ω	.8Ω			
93	" " " B	.5Ω	.2Ω			
94	" " " A	.1Ω	0Ω			
95	Osc. Coil-Bnd. D	.8Ω	2.6Ω			
96	" " " C	1.6Ω	.8Ω			
97	" " " B	.5Ω	0Ω			
98	" " " A	0Ω	0Ω			
99	1st IF Trans.	2Ω	2Ω	SA-3363		
100	2nd " "	2Ω	2Ω	SA-3363		
101	3rd " "	2Ω	2Ω	SA-3363		
102	BFO Trans.			SA-3364		
111	AVC Induct.	46Ω				

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA	INSTALLATION NOTES
103	Screw	115	.05				Type C-7

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
104	Limiter Switch		On-Off
105	AVC Switch		"
106	BFO Switch		"
107	Tone Switch		
108	Band Switch		
109	Tuning Cap.		2 Gang Variable Cap.
110	Bandspread Gang		

CONTROLS

The MAIN TUNING control knob is located to the left of the center of the front panel. This knob operates a two gang variable capacitor through a 30 to 1 radio reduction drive mechanism. The main tuning dial is the full vision slide rule type and features four accurate scales calibrated in megacycles which are easily and quickly read.

The ELECTRICAL BANDSPREAD control knob is located to the right of the center of the front panel. This knob operates a separate two gang variable capacitor to provide bandspread tuning. Thres is a separate scale and pointer provided for accurate logging of bandspread channels.

The BAND SELECTOR switch is located at the center of the front panel and functions to select the tuning band desired. The band in use is indicated by the designating letters on this switch dial. The four tuning scales on the main tuning dial are marked at either end of the dial by these designating letters.

Tuning is accomplished by the following steps:

(a) Select the band to be used by means of the BAND SELECTOR switch.

(b) The frequency calibration of the main tuning dial will only be correct with the bandspread pointer set at 90. After this setting has been made the MAIN TUNING control knob is used to tune in the desired station. The bandspread pointer may then be used to give greater accuracy in logging.

The TONE CONTROL switch is located at the upper left-hand side of the receiver and functions to select the frequency characteristic of the audio amplifier as desired, i.e. HIGH or LOW. The HIGH position will give the better fidelity and the LOW a better signal to noise ratio.

The C.W.O. CONTROL switch is located to the right of the TONE CONTROL switch functioning to switch on or off the beat frequency oscillator.

The VOLUME control is located to the left of the MAIN TUNING knob functioning to adjust the audio amplification of the receiver. Part of this control is a stand-by switch permitting the AC line switch to remain on but with B supply circuit open.

The LIMITER CONTROL switch is located at the upper right-hand side of the front panel functioning to switch "On" or "Off" the noise limiter. This control is normally in the "Off" position but can be turned "On" to suppress any undesired noise pulses.

The AVC CONTROL switch is located to the left of the LIMITER switch functioning to switch the automatic volume control circuits into or out of the receiver circuits.

The SENSITIVITY control is located to the right of the BANDSPREAD control knob and functions to adjust the amplification of the two I.F. amplifier tubes. Incorporated in this control is the power supply "ON" "OFF" switch; with this switch in the "Off position the receiver is inoperative.

There is a B.S.W. terminal panel provided at the rear of the receiver to permit remote stand-by control. The terminals are connected in series with the B switch.

CONTROLS SET AS FOLLOWS: VOLUME AND SENSITIVITY CONTROLS "FULL ON", AVC AND LIMITER "ON", TONE SWITCH ON "HIGH", BAND SWITCH AT "D", CWO SWITCH "ON" FOR 6SJ7 READINGS ONLY.

VOLTAGE READINGS

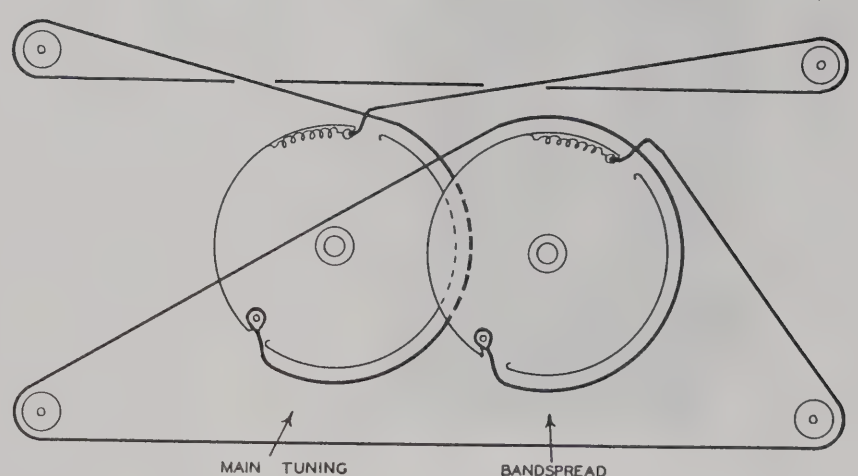
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0V.	17V.AC	103V.DC	98V.DC	−1.8V.DC	76V.DC	11V.AC	3V.DC	0V.
2	6SG7	0V.	17V.AC	115V.DC	0V.	1.15V.DC	57V.DC	23.5V.AC	103V.DC	
3	6SG7	0V.	30V.AC	1.75V.DC	0V.	1.75V.DC	87V.DC	23.5V.AC	102V.DC	
4	6H6	0V.	0V.	−.1V.DC	0V.	−.2V.DC	0V.	5V.AC	0V.	
5	6SJ7	0V.	30V.AC	0V.	−35V.DC	0V.	−.2V.DC	35.5V.AC	40V.DC	
6	6SF7	0V.	0V.	15V.DC	107V.DC	0V.	107V.DC	5V.AC	11V.AC	
7	6SC7	0V.	49V.DC	.3V.DC	0V.	73V.DC	105V.DC	42V.AC	35.5V.AC	
8	25L6GT/G	0V.	42V.AC	112V.DC	107V.DC	.4V.DC	0V.	70V.AC	7.1V.DC	
9	25L6GT/G	0V.	95V.AC	112V.DC	107V.DC	.2V.DC	.3V.DC	70V.AC	7.1V.DC	
10	25Z5	95V.AC	117V.AC	117V.DC	117V.DC	117V.AC	117V AC			

RESISTANCE READINGS

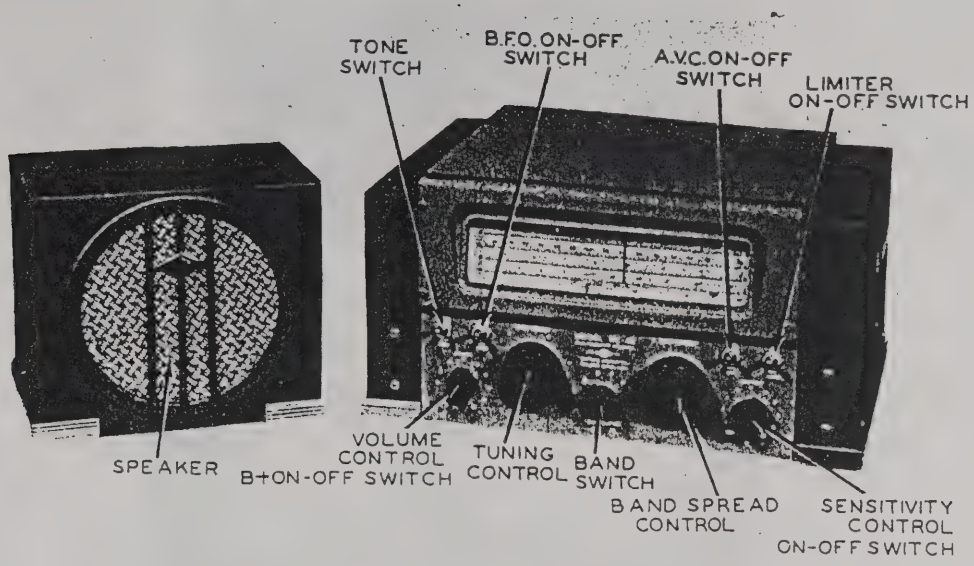
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0Ω	1Ω	51KΩ	51KΩ	19.5KΩ	60KΩ	8Ω	225Ω	1.3MEG.
2	6SG7	0Ω	1Ω	510 Ω	1.3MEG.	510Ω	35KΩ	15Ω	51KΩ	
3	6SG7	0Ω	1Ω	490Ω	1.3MEG.	490Ω	73KΩ	15Ω	52KΩ	
4	6H6	0Ω	0Ω	450KΩ	2.7MEG.	875KΩ	1.8MEG.	4Ω	0Ω	
5	6SJ7	0Ω	1Ω	0Ω	43KΩ	.6Ω	95KΩ	22Ω	82KΩ	
6	6SF7	0Ω	1.8MEG.	19.5 KΩ	50KΩ	450KΩ	50KΩ	4Ω	8Ω	
7	6SC7	0Ω	320KΩ	265KΩ	510KΩ	320 KΩ	29KΩ	26Ω	22Ω	
8	25L6GT/G	0Ω	26Ω	50KΩ	50KΩ	530KΩ	INF.	37Ω	58Ω	
9	25L6GT/G	0Ω	49Ω	50KΩ	50KΩ	520KΩ	265KΩ	37Ω	58Ω	
10	25Z5	49Ω	56Ω	50KΩ	50KΩ	56Ω	56Ω			

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.



DIAL CORD DRIVE



NATIONAL MODEL NC-46

TRADE NAME	National Model NC-46
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC-DC 4 Band Superheterodyne Communications Receiver
TUBES (TEN)	Types, 6K8 Converter, 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 2nd Det.-Limiter, 6SJ7 BFO, 6SF7 AVC, 6SC7 Amp.-Phase Inv., 2-25L6GT Power Output, 25Z5GT Rectifier.
POWER SUPPLY	110-130 Volts AC — RATING .540 Amps. @ 117V AC
TUNING RANGE—BROADCAST	540-1600KC — SHORT WAVE 1.55-4.6MC, 4.4-12.0MC, 11.5-30.0 MC

ALIGNMENT INSTRUCTIONS

To set pointer, turn variable fully closed and set pointer at last reference mark at the left end of the "D" scale. Disconnect the antenna and set the controls as follows: Volume control at maximum, tone switch at "Hi" position, C.W.O. off, A.V.C. off, limiter off and sensitivity control at maximum. To determine correct IF Freq., feed signal into converter grid and slowly turn signal generator between 452 and 456KC. At the point where there is a sharp increase in the output is the correct IF freq. Keep band spread pointer at 90 throughout alignment procedure. Care should be taken that the oscillator is not aligned on the image freq. To check, increase the output of the signal generator and tune the receiver approx. 910KC below the signal generator freq. The image freq. should be heard and should be considerably weaker. If the image freq. is not heard, the oscillator trimmer should be decreased in capacity until the fundamental freq. appears at the proper dial setting. Use isolation trans. if available. If not, connect capacitor in series with the low side of the signal generator and chassis. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to grid cap of 6K8. Low side to chassis.	See instructions above	D	High freq. end.	Across voice coil	A1,A2, A3,A4, A5,A6.	Adjust for maximum output. If isolation trans. is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
.1 MFD.	"	"	"	"	"	A7	Turn CWO switch "on" and adjust for an approximate 1000 cycle audio note.
500 ohm carbon resistor	High side to ant. terminal. Low side to chassis.	30.0MC	A	30.0MC	"	A8	Turn CWO to "off" position. Adjust for maximum output.
"	"	28.0MC	"	Tune for maximum output.	"	A9	Rock dial and adjust for maximum output.
"	"	12.0MC	B	12.0MC	"	A10	Adjust for maximum output.
"	"	11.0MC	"	Tune for maximum output.	"	A11	Rock dial and adjust for maximum output.
"	"	4.6MC	C	4.6MC	"	A12	Adjust for maximum output.
"	"	4.0MC	"	Tune for maximum output.	"	A13	Rock dial and adjust for maximum output.
"	"	1500KC	D	1500KC	"	A14	Adjust for maximum output.
"	"	600KC	"	600KC	"	A15	Adjust for maximum output. Recheck A14 at 1500KC.
"	"	1400KC	"	Tune for maximum output.	"	A16	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1946 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc."

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6K8	6K8	8K	
2	1st IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	2nd Det.-Limiter	6H6	6H6	7Q	
5	BFO	6SJ7	6SJ7	8N	
6	AVC	6SK7	6SK7	7AZ	
7	Amp.-Phase Inv.	6SC7	6SC7	8S	
8	Power Output	25L6GT/G	25L6GT/G	7AC	
9	Power Output	25L6GT/G	25L6GT/G	7AC	
10	Rectifier	25Z5GT	25Z5GT	6E	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	Filter
12	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	"
13	25	50		M-25-50	TA-525	PRS50-25	BR255	TC36	Audio Cath. Bypass
14	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Line Filter
15	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	BFO Plate Decoupling
16	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Filament Bypass
17	.02	400		S-4-02	TC-12	484-02	DT4S2	TP423	Tone Compensation
18	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	25L6 Plate Bypass
19	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
20	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	" "
21	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Vol. Cont. Isolation
22	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Noise Limiter Filter
24	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Plate Bypass
25	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Cath. Bypass
27	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Grid Bypass
28	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Plate Bypass
29	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
30	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Cath. Bypass
31	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	RF Bypass Pwr. Supp.
32	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Filter
33	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Cath. Bypass
34	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Grid Bypass
35	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Plate Bypass
36	.1	200		S-4-1M	TC-10	484-.1	DT4W1	TP422	RF Bypass Pwr. Supp.
37	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Screen Bypass
38	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Cath. Bypass
39	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Cabinet Isolation
40	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
41	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Voice Coil Isolation
42	270	500		MO.5-325	1FM-325	1468-00025	5W5T25	MC240	Audio Grid Bypass
43	1	400							BFO Coupling
44	50	500		MO.5-45	1FM-45	1468-00005	5W5Q5	MC225	Audio Coupling
45	1000	500		MO.3-21	1FM-21	1467-001	5W5D1	MC255	AVC Diode Coupling
46	270	500		MO.5-325	1FM-325	1468-00025	5W5T25	MC240	6H6 Plate Bypass
47	100	500		MO.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
48	4700	500		MW.5-25	1FM-25	1467-005	1D5D5	MC465	Osc. Coupling
49	Capacitor Ratings Differ for each Coil Range and Definite Ratings cannot be Listed.								
112	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.*

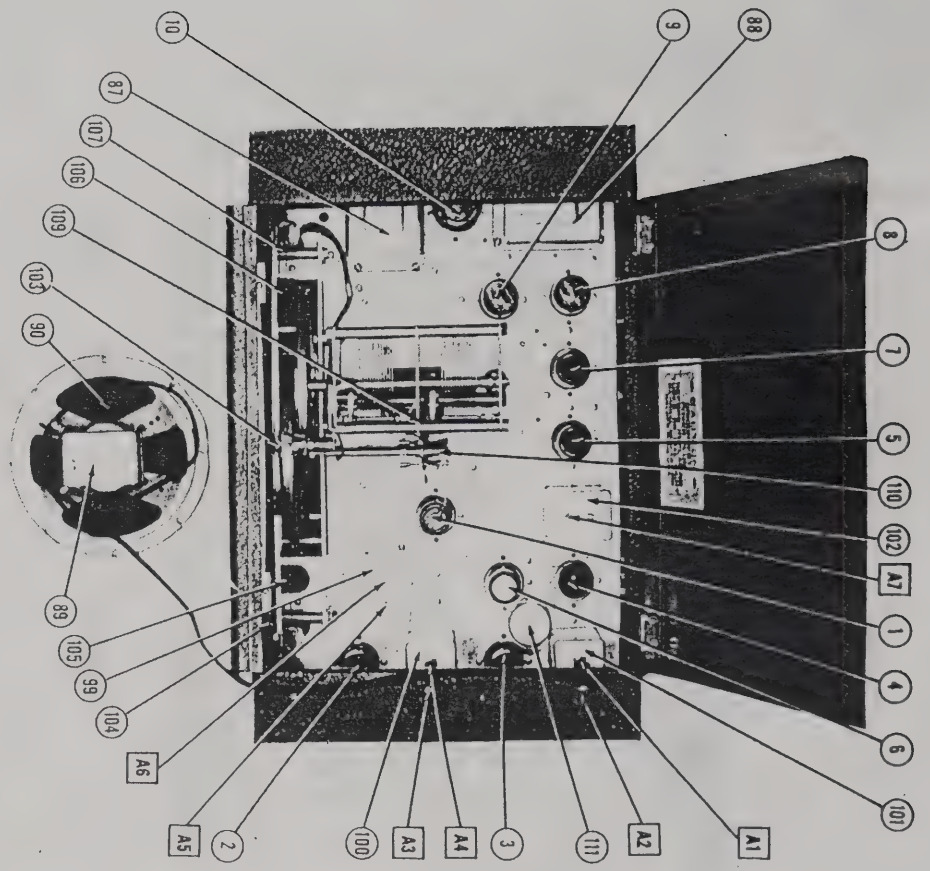
*Not Used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
50A	500KΩ	1		MR48/	D13-133/	M-60-Z/	Volume Control & B+ Switch
B	Shaft			Not Req.	A	Not Req.	Attach to 50A per Instructions
C	Switch			M26	41	SW-A	" " " " "
51A	10KΩ	1.5		G	W-10K	P-58-S-10K	Sensitivity Control & AC Switch
B	Shaft			Not Req.	A		Attach to 51A per Instructions
C	Switch			6-9	41		" " " " "

/Use ground lug supplied with control for shell bypass and original insulating sleeve to isolate control from chassis.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No	IRC PART No.	
54	10KΩ	½		BTS-10K	Br.-Blk.-Or. Oscillator Plate Load
55	220Ω	½		BW-½-220	Red-Red-Br. Converter Cathode
56	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Screen Dropping
57	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
58	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Plate Dropping
59	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Network
60	560Ω	½		BTS-560	Grn.-Blue-Br. 1st IF Cathode
61	22KΩ	½		BTS-22K	Red-Red-Or. 1st IF Screen Dropping
62	1000Ω	½		BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
63	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Network
64	560Ω	½		BTS-560	Grn.-Blue-Br. 2nd IF Cathode
65	22KΩ	½		BTS-22K	Red-Red-Or. 2nd IF Screen Dropping
66	1200Ω	½		BTS-1200	Red-Red-Red 2nd IF Plate Decoupling
67	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Noise Limiter Filter
68	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. Diode Load
69	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Noise Limiter Diode Load
70	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. Diode Load
71	3700Ω	½		BTS-3900	Or.-Vl.-Red 1st AF Cathode
72	270KΩ	½		BTS-270K	Red-Vl.-Yl. 1st AF Plate Load
73	270KΩ	½		BTS-270K	Red-Vl.-Yl. 2nd AF Grid
74	270KΩ	½		BTS-270K	Red-Vl.-Yl. 2nd AF Plate Load
75	68Ω	2		BW-2-68	Blue-White-Blk. Output Cathode
76	270KΩ	½		BTS-270K	Red-Vl.-Yl. Output Grid
77	270KΩ	½		BTS-270K	Red-Vl.-Yl. Output Grid
78	5Ω	5		A5-5	Headphone Shunt
79	100KΩ	½		BTS-100K	Br.-Blk.-Yl. BFO Plate Dropping
80	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Bleeder
81	150KΩ	½		BTS-150K	Br.-Blk.-Yl. Bleeder
82	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Network
83	470KΩ	½		BTS-470K	Yl.-Vl.-Yl. AVC Load
84	22KΩ	½		BTS-22K	Red-Red-Or. AVC Amplifier Cathode
85	2 Meg.	½		BTS-2.2 Meg.	Red-Blk.-Grn. AVC Amplifier Grid
86	100Ω	½		BW-½-100	Br.-Blk.-Br. Detecter-Limiter Filament Shunt
87	33KΩ	½		BTS-33K	Or.-Or.-Or. Bleeder

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA			INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000~)	NATIONAL PART NO.	STANCOR PART NO.	THORDARSON PART NO.	
97	250 MA	270Ω	10 Henries		C-1555I	T20C55I	Drill new mounting hole.

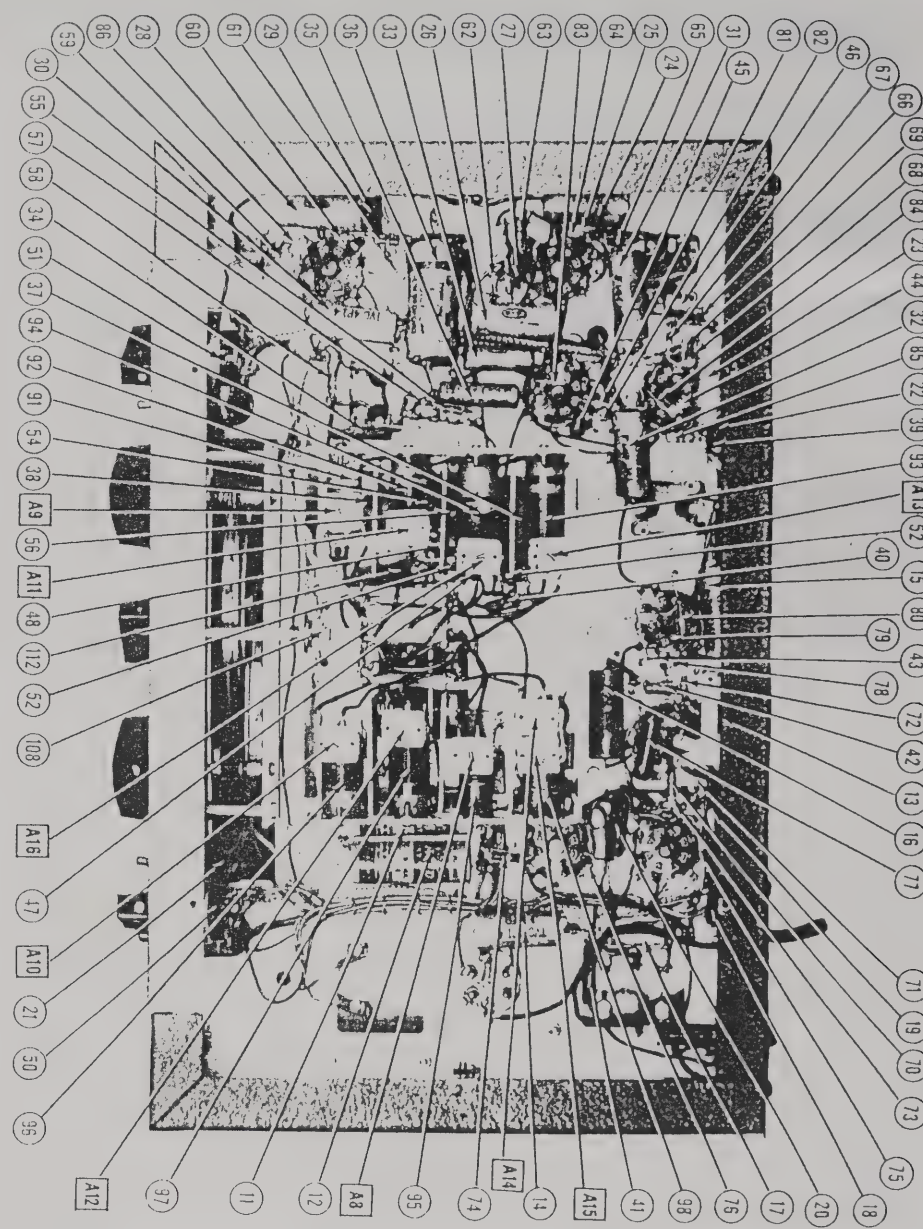
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
98	1500Ω CT	3.4Ω	65Ω CT	.4Ω					

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	NATIONAL PART No.	JENSEN PART No.		
99	1H	3.2Ω		SF-111 Mod. 16-V		
	CONE DIA.	VC DIA.				
00	6"	5/8"	NOT REPAIRABLE REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA MEISSNER PART No.	INSTALLATION NOTES
91	Ant. Coil-Bnd. D	3Ω	5Ω			
92	" " " C	1.5Ω	.8Ω			
93	" " " B	.5Ω	.2Ω			
94	" " " A	.1Ω	0Ω			
95	Osc. Coil-Bnd. D	.8Ω	2.6Ω			
96	" " " C	1.6Ω	.8Ω			
97	" " " B	.5Ω	0Ω			
98	" " " A	0Ω	0Ω			
99	1st IF Trans.	2Ω	2Ω	SA-3363		
100	2nd " "	2Ω	2Ω	SA-3363		
101	3rd " "	2Ω	2Ω	SA-3363		
102	BFO Trans.			SA-3364		
111	AVC Induct.	46Ω				

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA	INSTALLATION NOTES
103	Screw	115	.05				Type C-7

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
104	Limiter Switch		On-Off
105	AVC Switch		"
106	BFO Switch		"
107	Tone Switch		
108	Band Switch		
109	Tuning Cap.		2 Gang Variable Cap.
110	Bandspread Gang		

CONTROLS

The MAIN TUNING control knob is located to the left of the center of the front panel. This knob operates a two gang variable capacitor through a 30 to 1 radio reduction drive mechanism. The main tuning dial is the full vision slide rule type and features four accurate scales calibrated in megacycles which are easily and quickly read.

The ELECTRICAL BANDSPREAD control knob is located to the right of the center of the front panel. This knob operates a separate two gang variable capacitor to provide bandspread tuning. Thres is a separate scale and pointer provided for accurate logging of bandspread channels.

The BAND SELECTOR switch is located at the center of the front panel and functions to select the tuning band desired. The band in use is indicated by the designating letters on this switch dial. The four tuning scales on the main tuning dial are marked at either end of the dial by these designating letters.

Tuning is accomplished by the following steps:

(a) Select the band to be used by means of the BAND SELECTOR switch.

(b) The frequency calibration of the main tuning dial will only be correct with the bandspread pointer set at 90.. After this setting has been made the MAIN TUNING control knob is used to tune in the desired station. The bandspread pointer may then be used to give greater accuracy in logging.

The TONE CONTROL switch is located at the upper left-hand side of the receiver and functions to select the frequency characteristic of the audio amplifier as desired, i.e. HIGH or LOW. The HIGH position will give the better fidelity and the LOW a better signal to noise ratio.

The C.W.O. CONTROL switch is located to the right of the TONE CONTROL switch functioning to switch on or off the beat frequency oscillator.

The VOLUME control is located to the left of the MAIN TUNING knob functioning to adjust the audio amplification of the receiver. Part of this control is a stand-by switch permitting the AC line switch to remain on but with B supply circuit open.

The LIMITER CONTROL switch is located at the upper right-hand side of the front panel functioning to switch "On" or "Off" the noise limiter. This control is normally in the "Off" position but can be turned "On" to suppress any undesired noise pulses.

The AVC CONTROL switch is located to the left of the LIMITER switch functioning to switch the automatic volume control circuits into or out of the receiver circuits.

The SENSITIVITY control is located to the right of the BANDSPREAD control knob and functions to adjust the amplification of the two I.F. amplifier tubes. Incorporated in this control is the power supply "ON" "OFF" switch; with this switch in the "Off position the receiver is inoperative.

There is a B.S.W. terminal panel provided at the rear of the receiver to permit remote stand-by control. The terminals are connected in series with the B switch.

CONTROLS SET AS FOLLOWS: VOLUME AND SENSITIVITY CONTROLS FULL ON, AVC AND LIMITER ON, TONE SWITCH ON HIGH, BAND SWITCH AT D, CWO SWITCH ON FOR 6SJ7 READINGS ONLY.

VOLTAGE READINGS

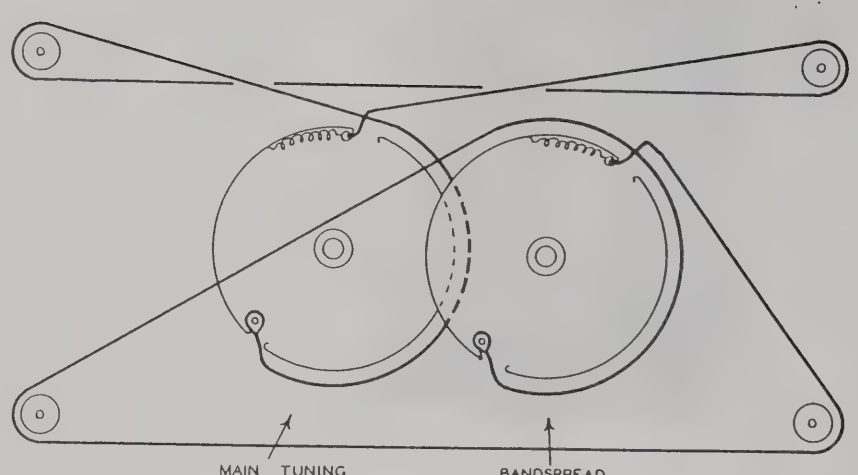
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0V.	17 V.AC	103V.DC	98V.DC	-1.8V.DC	76V.DC	11V.AC	3V.DC	0V.
2	6SG7	0V.	17 V.AC	1.15V.DC	0V.	1.15 V.DC	57 V.DC	23.5V.AC	103V.DC	
3	6SG7	0V.	30V.AC	1.75V.DC	0V.	1.75V.DC	87 V.DC	23.5V.AC	102V.DC	
4	6H6	0V.	0V.	-.1V.DC	0V.	-.2 V.DC	0V.	5 V.AC	0V.	
5	6SJ7	0V.	30V.AC	0V.	-.35V.DC	0V.	-.2V.DC	35.5V.AC	40V.DC	
6	6SF7	0V.	0V.	15V.DC	107V.DC	0V.	107V.DC	5 V.AC	11 V.AC	
7	6SC7	0V.	49V.DC	.3V.DC	0V.	7.3V.DC	105V.DC	42V.AC	35.5V.AC	
8	25L6GT/G	0V.	42 V.AC	112V.DC	107V.DC	.4 V.DC	0V.	70V.AC	7.1V.DC	
9	25L6GT/G	0V.	95V.AC	112 V.DC	107V.DC	.2V.DC	.3V.DC	70V.AC	7.1V.DC	
10	25Z5	95V.AC	117V.AC	117V.DC	117V.DC	117V.AC	117 V AC			

RESISTANCE READINGS

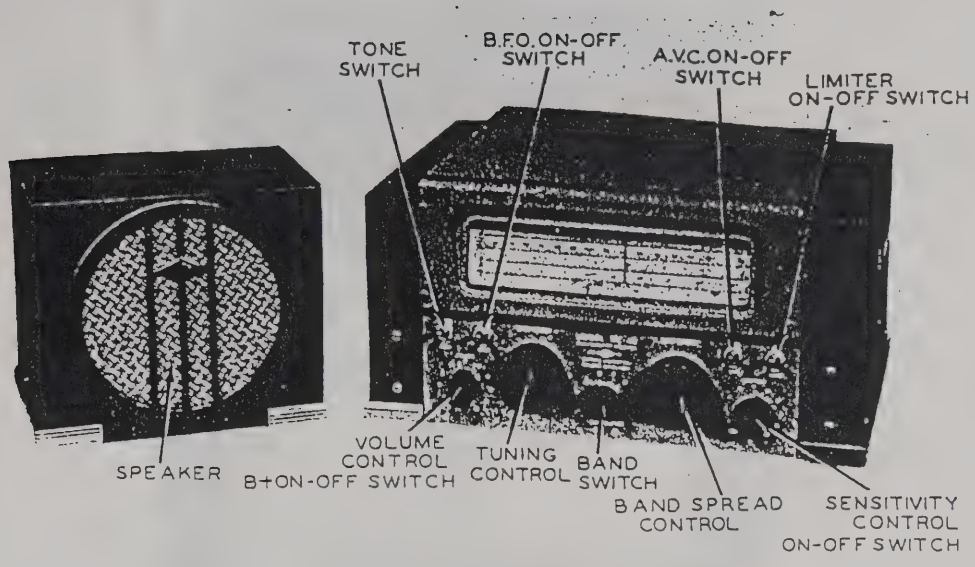
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0Ω	11Ω	51KΩ	51KΩ	19.5KΩ	60KΩ	8Ω	225Ω	1.3MEG.
2	6SG7	0Ω	11Ω	510 Ω	1.3MEG.	510Ω	35KΩ	15Ω	51KΩ	
3	6SG7	0Ω	18Ω	490Ω	1.3MEG.	490Ω	73KΩ	15Ω	52KΩ	
4	6H6	0Ω	0Ω	450KΩ	2.7MEG.	875KΩ	1.8MEG.	4Ω	0Ω	
5	6SJ7	0Ω	18Ω	0Ω	43KΩ	.6Ω	95KΩ	22Ω	82KΩ	
6	6SF7	0Ω	1.8MEG.	19.5 KΩ	50KΩ	450KΩ	50KΩ	4Ω	8Ω	
7	6SC7	0Ω	320KΩ	265KΩ	510KΩ	320 KΩ	29KΩ	26Ω	22Ω	
8	25L6GT/G	0Ω	26Ω	50KΩ	50KΩ	530KΩ	INF.	37Ω	58Ω	
9	25L6GT/G	0Ω	49Ω	50KΩ	50KΩ	520KΩ	265KΩ	37Ω	58Ω	
10	25Z5	49Ω	56Ω	50KΩ	50KΩ	56Ω	56Ω			

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.



DIAL CORD DRIVE



NATIONAL MODEL NC-46

TRADE NAME	National Model NC-46
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC-DC 4 Band Superheterodyne Communications Receiver
TUBES (TEN)	Types, 6K8 Converter, 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 2nd Det.-Limiter, 6SJ7 BFO, 6SF7 AVC, 6SC7 Amp.-Phase Inv., 2-25L6GT Power Output, 25Z5GT Rectifier.
POWER SUPPLY	110-130 Volts AC — RATING .540 Amps. @ 117V AC
TUNING RANGE—BROADCAST	540-1500KC — SHORT WAVE 1.55-4.6MC, 4.4-12.0MC, 11.5-30.0MC

ALIGNMENT INSTRUCTIONS

To set pointer, turn variable fully closed and set pointer at last reference mark at the left end of the "D" scale. Disconnect the antenna and set the controls as follows: Volume control at maximum, tone switch at "Hi" position, C.W.O. off, A.V.C. off, limiter off and sensitivity control at maximum. To determine correct IF Freq., feed signal into converter grid and slowly turn signal generator between 452 and 458KC. At the point where there is a sharp increase in the output is the correct IF freq. Keep band spread pointer at 90 throughout alignment procedure. Care should be taken that the oscillator is not aligned on the image freq. To check, increase the output of the signal generator and tune the receiver approx. 910KC below the signal generator freq. The image freq. should be heard and should be considerably weaker. If the image freq. is not heard, the oscillator trimmer should be decreased in capacity until the fundamental freq. appears at the proper dial setting. Use isolation trans. if available. If not, connect capacitor in series with the low side of the signal generator and chassis. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to grid cap of 6K8. Low side to chassis.	See instructions above	D	High freq. end.	across voice coil	A1,A2, A3,A4, A5,A6.	Adjust for maximum output. If isolation trans. is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
.1 MFD.	"	"	"	"	"	A7	Turn CWO switch "on" and adjust for an approximate 1000 cycle audio note.
500 ohm carbon resistor	High side to ant. terminal. Low side to chassis.	30.0MC	A	30.0MC	"	A8	Turn CWO to "off" position. Adjust for maximum output.
"	"	28.0MC	"	Tune for maximum output.	"	A9	Rock dial and adjust for maximum output.
"	"	12.0MC	B	12.0MC	"	A10	Adjust for maximum output.
"	"	11.0MC	"	Tune for maximum output.	"	A11	Rock dial and adjust for maximum output.
"	"	4.8MC	C	4.8MC	"	A12	Adjust for maximum output.
"	"	4.3MC	"	Tune for maximum output.	"	A13	Rock dial and adjust for maximum output.
"	"	1500KC	D	1500KC	"	A14	Adjust for maximum output.
"	"	600KC	"	600KC	"	A15	Adjust for maximum output. Recheck A14 at 1500KC.
"	"	1500KC	"	Tune for maximum output.	"	A16	Adjust for maximum output.

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1946 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc."

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6K8	6K8	8K	
2	1st IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	2nd Det.-Limiter	6H6	6H6	7Q	
5	BFO	6SJ7	6SJ7	8N	
6	AVC	6SK7	6SK7	7AZ	
7	Amp.-Phase Inv.	6SC7	6SC7	8S	
8	Power Output	25L6GT/G	25L6GT/G	7AC	
9	Power Output	25L6GT/G	25L6GT/G	7AC	
10	Rectifier	25Z5GT	25Z5GT	6E	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	Filter
12	40	150		M-40-150	UT-401	PRS150-40	BR4015	TC48	"
13	25	50		M-25-50	TA-525	PRS50-25	BR2505	TC36	Audio Cath. Bypass
14	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Line Filter
15	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	BFO Plate Decoupling
16	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Filament Bypass
17	.02	400		S-4-02	TC-12	484-02	DT4S2	TP423	Tone Compensation
18	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	25L6 Plate Bypass
19	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
20	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	" "
21	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Vol. Cont. Isolation
22	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Noise Limiter Filter
24	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Plate Bypass
25	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	2nd IF Cath. Bypass
27	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Grid Bypass
28	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Plate Bypass
29	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
30	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	1st IF Cath. Bypass
31	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	RF Bypass Pwr. Supp.
32	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Filter
33	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	AVC Cath. Bypass
34	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Grid Bypass
35	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Plate Bypass
36	.1	400		S-4-1M	TC-10	484-.1	DT4W1	TP422	RF Bypass Pwr. Supp.
37	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Screen Bypass
38	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Conv. Cath. Bypass
39	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	Cabinet Isolation
40	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
41	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	Voice Coil Isolation
42	270	500		MO.5-325	1FM-325	1468-00025	5W5T25	MC340	Audio Grid Bypass
43	1	400							BFO Coupling
44	50	500		MO.5-45	1FM-45	1468-00005	5W5Q5	MC225	Audio Coupling
45	1000	500		MO.3-21	1FM-21	1467-001	5W5D1	MC255	AVC Diode Coupling
46	270	500		MO.5-325	1FM-325	1468-00025	5W5T25	MC340	6H6 Plate Bypass
47	100	500		MO.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
48	4700	500		MW.5-25	1FM-25	1467-005	1D5D5	MC465	Osc. Coupling
49	Capacitor ratings differ for each coil range and definite ratings cannot be Listed.								
112	.01	400		S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.*

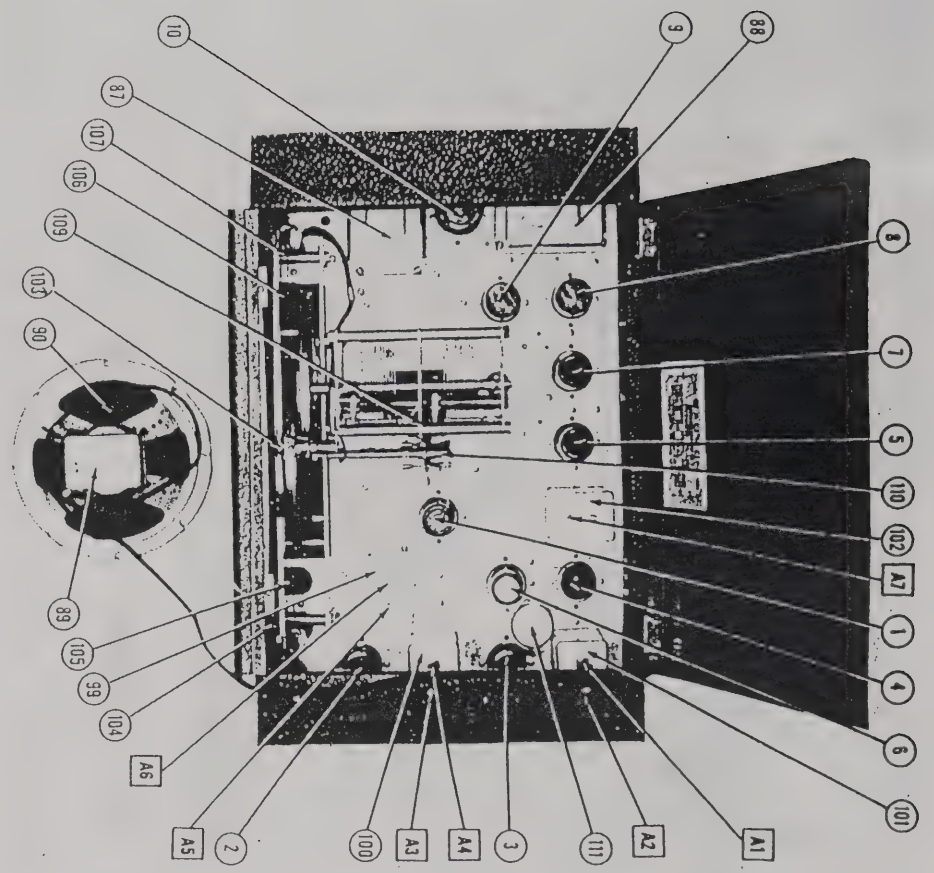
*Not Used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
50A	500KΩ	1		MR48/	D13-133/	N-60-4/	Volume Control & B+ Switch
B	Shaft			Not Req.	A	Not Req.	Attach to 50A per Instructions
C	Switch			M26	41	SW-A	" " " " "
51A	10KΩ	1.5		J	W-10K	P-58-S-10K	Sensitivity Control & AC Switch
B	Shaft			Not Req.	A		Attach to 51A per Instructions
C	Switch			G-9	41		" " " " "

/Use ground lug supplied with control for shell bypass and original insulating sleeve to isolate control from chassis.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
					[illegible]-Yl. Yl. Vc Netwrk
					[illegible]-blk.-Or. Oscillator Plate Load
					Red Red Brn. Converter Cathode
					[illegible]-blk.-Red Converter Screen Dropping
					Red-Red-Or. Oscillator Grid
				BF-[illegible]	Br.-blk.-Red Converter Plate Dropping
					Yl. Vl. Yl. AVC Network
					[illegible] Blue-Br. 1st IF Cathode
					Red-Red-Or. 1st IF Screen Dropping
					[illegible]-Vl. Yl. AVC Network
					[illegible] Blue Br. 2nd IF Cathode
					Red Red-Or. 2nd IF Screen Dropping
					Red-Red-Red 2nd IF Plate Decoupling
					[illegible]-blk.-Grn. Noise Limiter Filter
					Yl. Vl.-Yl. Diode Load
	1 Meg.			BF-1 Meg.	Br.-blk.-Grn. Noise Limiter Diode Load
	470K				Yl. Vl. Yl. Diode Load
	[illegible]				Or.-Vl.-Red 1st AF Cathode
	[illegible]				Red Vl. Yl. 1st AF Plate Load
	470K				Red-Vl. Yl. 2nd AF Grid
	[illegible]				Red-Vl. Yl. 1st AF Plate Load
	68				Blue-White-blk. Output Cathode
	[illegible]				Red Vl.-Yl. Output Grid
	[illegible]				Red-Vl.-Yl. Output Grid
	[illegible]				Telephone Shunt
76	100K			BF-100K	Br.-blk.-Yl. BFO Plate Dropping
79	100K			[illegible]	Brn.-Blk.-Yl. Bleeder
80	100K			[illegible]	Brn.-blk.-Yl. Bleeder
81	470K			[illegible]	Yl.-Vl.-Yl. AVC Network
82	470K			[illegible]-470K	Yl.-Vl.-Yl. AVC Load
83	[illegible]			[illegible]-[illegible]K	Red-Red-Or. AVC Amplifier Cathode
84	[illegible]			BF-[illegible] Meg.	Red-blk.-Grn. AVC Amplifier Grid
85	10K			BM-½-10K	Br.-blk.-Br. Detector-Limiter Filament Shunt
86	33K			BF-33K	Brn.-Or. Or. Bleeder

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA			INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000~)	NATIONAL PART NO.	STANCOR PART NO.	THORDARSON PART NO.	
37	50 Ma	375Ω	10 Henries		C-1955I	T30C93I	IDFIII new mounting hole.

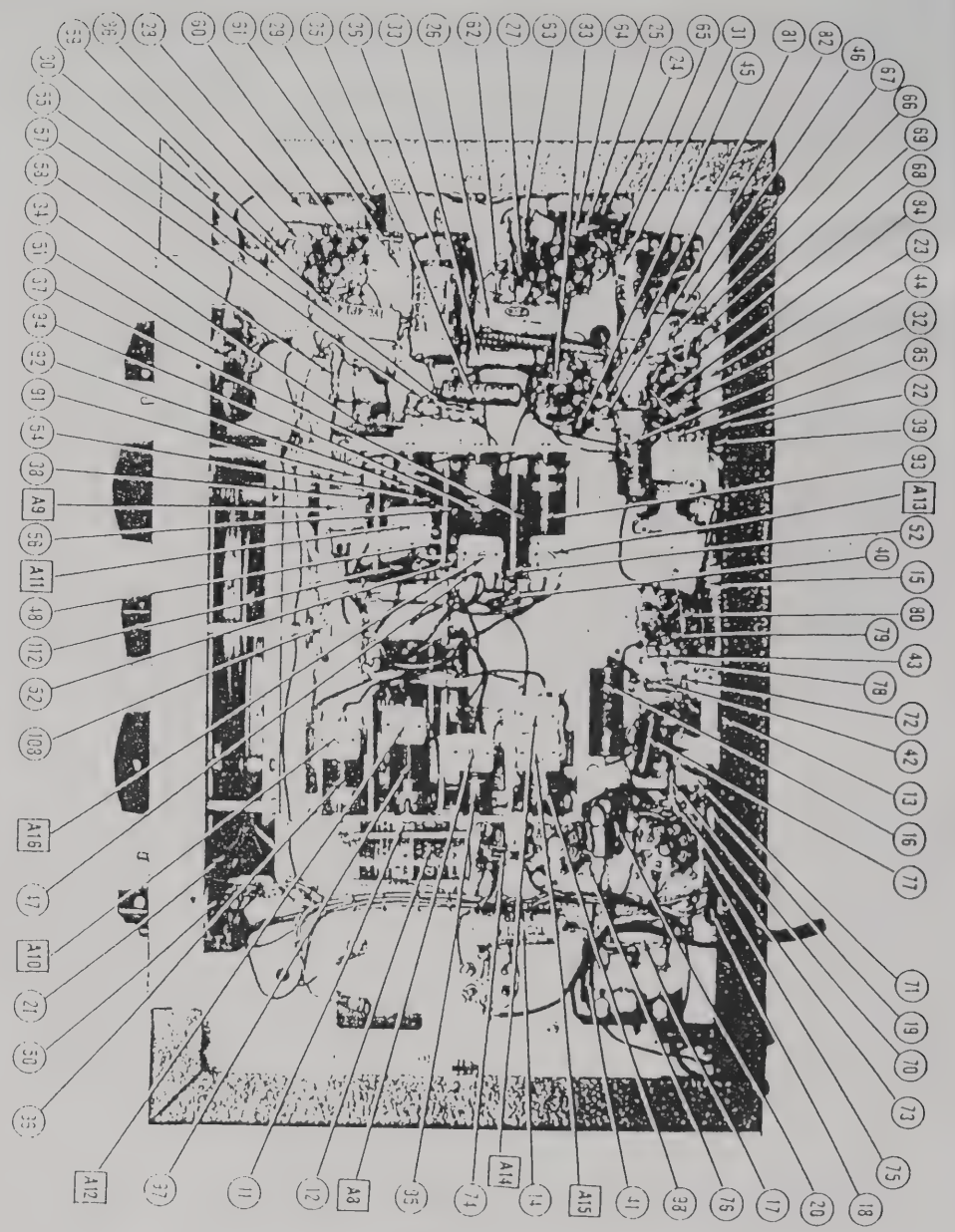
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
	[illegible] CT	[illegible]	685Ω CT	.4Ω					

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	[illegible]	[illegible]	NATIONAL PART No.	JENSEN PART No.		
05	[illegible]	[illegible]		[illegible] Mod. 16-V		
50	[illegible] 6"	[illegible] 5⅞"	NOT NATIONAL REPLACE...	E-SE COMPLETE SPEAKER UNIT.		

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA MEISSNER PART No.	INSTALLATION NOTES
91	Ant. Coil-Bnd. D	3Ω	5Ω			
92	" " " C	1.5Ω	.8Ω			
93	" " " B	.5Ω	.2Ω			
94	" " " A	.1Ω	0Ω			
95	Osc. Coil-Bnd. D	.8Ω	2.6Ω			
96	" " " C	1.6Ω	.8Ω			
97	" " " B	.5Ω	0Ω			
98	" " " A	0Ω	0Ω			
99	1st IF Trans.	2Ω	2Ω	SA-3363		
100	2nd " "	2Ω	2Ω	SA-3363		
101	3rd " "	2Ω	2Ω	SA-3363		
102	BFO Trans.			SA-3364		
111	AVC Induct.	46Ω				

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA	INSTALLATION NOTES
103	Screw	115	.05				Type C-7

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
104	Limiter Switch		On-Off
105	AVC Switch		"
106	BFO Switch		"
107	Tone Switch		
108	Band Switch		
109	Tuning Cap.		2 Gang Variable Cap.
110	BandSpread Cap.		

CONTROLS

The MAIN TUNING control knob is located to the left of the center of the front panel. This knob operates a two gang variable capacitor through a 30 to 1 radio reduction drive mechanism. The main tuning dial is the full vision slide rule type and features four accurate scales calibrated in megacycles which are easily and quickly read.

The ELECTRICAL BANDSPREAD control knob is located to the right of the center of the front panel. This knob operates a separate two gang variable capacitor to provide bandspread tuning. There is a separate scale and pointer provided for accurate logging of bandspread channels.

The BAND SELECTOR switch is located at the center of the front panel and functions to select the tuning band desired. The band in use is indicated by the designating letters on this switch dial. The four tuning scales on the main tuning dial are marked at either end of the dial by these designating letters.

Tuning is accomplished by the following steps:

(a) Select the band to be used by means of the BAND SELECTOR switch.

(b) The frequency calibration of the main tuning dial will only be correct with the bandspread pointer set at 90. After this setting has been made the MAIN TUNING control knob is used to tune in the desired station. The bandspread pointer may then be used to give greater accuracy in logging.

The TONE CONTROL switch is located at the upper left-hand side of the receiver and functions to select the frequency characteristic of the audio amplifier as desired, i.e. HIGH or LOW. The HIGH position will give the better fidelity and the LOW a better signal to noise ratio.

The C.W.O. CONTROL switch is located to the right of the TONE CONTROL switch functioning to switch on or off the beat frequency oscillator.

The VOLUME control is located to the left of the MAIN TUNING knob functioning to adjust the audio amplification of the receiver. Part of this control is a stand-by switch permitting the AC line switch to remain on but with B supply circuit open.

The LIMITER CONTROL switch is located at the upper right-hand side of the front panel functioning to switch "On" or "Off" the noise limiter. This control is normally in the "Off" position but can be turned "On" to suppress any undesired noise pulses.

The AVC CONTROL switch is located to the left of the LIMITER switch functioning to switch the automatic volume control circuits into or out of the receiver circuits.

The SENSITIVITY control is located to the right of the BANDSPREAD control knob and functions to adjust the amplification of the two I.F. amplifier tubes. Incorporated in this control is the power supply "ON" "OFF" switch; with this switch in the "Off position the receiver is inoperative.

There is a B.S.W. terminal panel provided at the rear of the receiver to permit remote stand-by control. The terminals are connected in series with the B switch.

CONTROLS SET AS FOLLOWS: VOLUME AND SENSITIVITY CONTROLS FULL ON, AVC AND LIMITER ON, TONE SWITCH ON HIGH, BAND SWITCH AT D, CWO SWITCH ON FOR 6SJ7 READINGS ONLY.

VOLTAGE READINGS

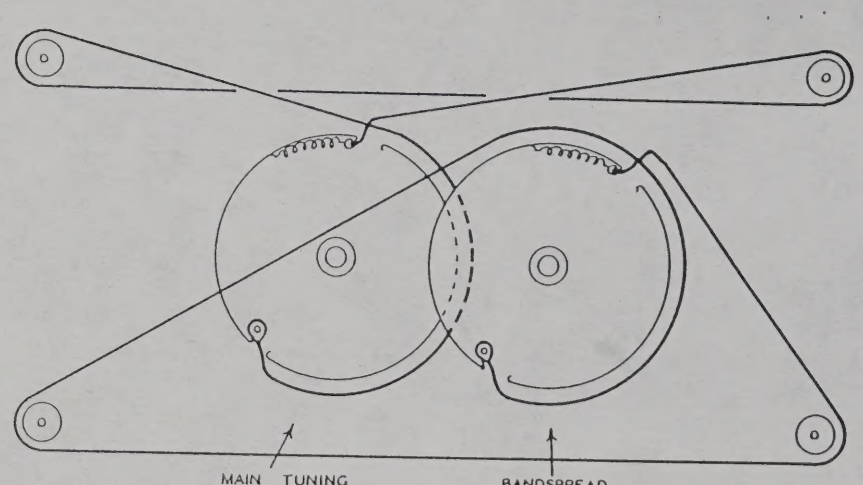
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0V.	17V.AC	103V.DC	98V.DC	-1.8V.DC	76V.DC	11V.AC	3V.DC	0V.
2	6SG7	0V.	17V.AC	1.15V.DC	0V.	1.15V.DC	57V.DC	23.5V.AC	103V.DC	
3	6SG7	0V.	30V.AC	1.75V.DC	0V.	1.75V.DC	87V.DC	23.5V.AC	102V.DC	
4	6H6	0V.	0V.	-1V.DC	0V.	-2V.DC	0V.	5V.AC	0V.	
5	6SJ7	0V.	30V.AC	0V.	-35V.DC	0V.	-2V.DC	35.5V.AC	40V.DC	
6	6SF7	0V.	0V.	15V.DC	107V.DC	0V.	107V.DC	5V.AC	11V.AC	
7	6SC7	0V.	49V.DC	.3V.DC	0V.	73V.DC	105V.DC	42V.AC	35.5V.AC	
8	25L6GT/G	0V.	42V.AC	112V.DC	107V.DC	.4V.DC	0V.	70V.AC	7.1V.DC	
9	25L6GT/G	0V.	95V.AC	112V.DC	107V.DC	.2V.DC	.3V.DC	70V.AC	7.1V.DC	
10	25Z5	95V.AC	117V.AC	117V.DC	117V.DC	117V.AC	117V AC			

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0Ω	11Ω	51KΩ	51KΩ	19.5KΩ	60KΩ	8Ω	225Ω	1.3MEG.
2	6SG7	0Ω	11Ω	510 Ω	1.3MEG.	510Ω	35KΩ	15Ω	51KΩ	
3	6SG7	0Ω	18Ω	490Ω	1.3MEG.	490Ω	73KΩ	15Ω	52KΩ	
4	6H6	0Ω	0Ω	450KΩ	2.7MEG.	875KΩ	1.8MEG.	4Ω	0Ω	
5	6SJ7	0Ω	18Ω	0Ω	43KΩ	.6Ω	95KΩ	22Ω	82KΩ	
6	6SF7	0Ω	1.8MEG.	19.5KΩ	50KΩ	450KΩ	50KΩ	4Ω	8Ω	
7	6SC7	0Ω	320KΩ	265KΩ	510KΩ	320KΩ	29KΩ	26Ω	22Ω	
8	25L6GT/G	0Ω	26Ω	50KΩ	50KΩ	530KΩ	INF.	37Ω	58Ω	
9	25L6GT/G	0Ω	49Ω	50KΩ	50KΩ	520KΩ	265KΩ	37Ω	58Ω	
10	25Z5	49Ω	56Ω	50KΩ	50KΩ	56Ω	56Ω			

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.



DIAL CORD DRIVE